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Upward Revision of Pulpwood Prices Predicted

Chief of Quebec Forest Service Declares Unprofitable Conditions, Affecting Revenues of Provincial Government, Cannot Continue—Canadian Newsprint Manufacturers Hope for Moderate Price Increase Later in Year—Spot Market Becoming Increasingly Important in View of Increasing Consumption

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., February 10, 1935—That an upward revision in the price of pulp wood must come was the statement made to the pulp and paper industry by Gustave C. Picke, Chief of the Forest Service of the Province of Quebec, when he was in Montreal last week. He declared that the present state of affairs, which was improfitable to pulp and paper companies, their employees, farmers and settlers, and which was affecting the revenues of the Provincial Government, could not continue.

"Pulpwood, which around 1920 sold readily at $30 a cord, is now selling with great difficulty at less than seven dollars a cord," he remarked, "notwithstanding the fact that pulpwood consumption is at present twice what it was then. Although Canada produces about 50 per cent of all the newsprint manufactured in the world, strange to say it cannot do much to establish the price of paper. Although statistics for 1935 show the production of our Canadian paper mills to have been 101 per cent of the output of 1929, regarded as the banner year, our mills worked only 72 per cent of their rated capacity, whereas formerly the demands for paper scarcely could be met."

The Price of Newsprint

There is some speculation here as to what the effect will be when the newsprint mill which the Ontario Paper Company is to build on the lower St. Lawrence this year comes into operation. The mill, which is to have an annual capacity of 100,000 tons of newsprint, is expected to come into operation next year. Whether or not when this new tonnage is put into consumption the displacement of the present supply will have an upsetting influence on next year's price situation, is a matter of discussion. Meanwhile, there are hopes that the present year may see a moderate increase in effect in the later months, but present hopes are centered in the action of the spot market, which is becoming increasingly important in view of increasing consumption.

Lake St. John Earnings Up

The annual report of the Lake St. John Power and Paper Company shows that for the year ended December 31 last, net income after depletion and depreciation, was $318,499 against $195,453, in 1934, but after allowing for all interest charges, there was a loss of $271,984 against a loss of $367,065. Net working capital rose from $973,964 to $1,309,665 during the year.

In his remarks to shareholders, A. Stewart McNichols, the president states in part: "Output at the mill averaged 88.1 per cent of capacity during the year, which is still below the amount stipulated in the sales contract of the company. Shipments of newsprint increased substantially during the latter part of the year, but the improvement came too late to entirely offset the deficiencies of the earlier months.

"Your directors feel fully justified by the past year's results in providing, as was done last year, for payment on February 1, 1936 of one interest coupon on the first mortgage bonds presently outstanding which involves a cash disbursement of $153,107."

It was further announced that the debenture-holders' committee has elected F. Gordon Osler, of Toronto, and A. Scott Fraser, of Montreal, to fill vacancies caused by the deaths of Arthur Jones and Col. R. F. Massie.

Pine Falls Plant

Official assurance has been given that the Pine Falls plant of the Manitoba Paper Company will operate on its present basis during the current year, but that there is little likelihood, under prevailing circumstances, of the second unit being put into operation this year. The total purchases of pulpwood this winter will be 40,000 cords.

The reopening of the plant has had a notably beneficial effect upon the economic position of Manitoba. Prior to that time practically the entire town of Pine Falls was on relief. Now conditions are approaching normal. The pulpwood purchases from settlers has also done much to re-establish business in the eastern areas of the province.

Bathurst Increases Capacity

At a meeting of directors of Bathurst Power and Paper Company, held in Montreal, Gerald T. Shipman was elected a vice-president of the company.

It is understood that the company is increasing the capacity of the machine making Fourdrinier Kraft Board from 30,000 to 51,000 tons per annum and proceeding to

(Continued on page 21)

Thilmany to Construct Modern Bleach Plant

Department to be Modernized to Provide for Increased Production—General Superintendent C. A. Seaborne Estimates New Buildings and Equipment Will Entail Expenditure of $130,000—Arrangements Being Made to Complete Financing

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., February 10, 1936—Construction of a new beater room and modern bleach plant in the near future is contemplated by the Thilmany Pulp and Paper Company, Kaukauna, Wis., according to announcement of C. R. Seaborne, general superintendent. Plans have been prepared, and arrangements are being made to complete the financing, which will include a possible loan of $40,000 from the City of Kaukauna. The city council has the matter under consideration and appears favorable if legal means can be found to render this assistance to the source of twenty per cent of its city taxes.

Mr. Seaborne estimates that the new buildings and equipment will entail an approximate expenditure of $130,000. The purpose will be to modernize this department and provide for increased production.

Northern Paper Mills Control

Control of the Northern Paper Mills, Green Bay, Wis., remains with Judson G. Rosebush and the Patten Paper Company, Ltd., Appleton, Wis., of which he is president, pending sale of their stock holdings to George F. Newton, Iron Mountain, Mich., according to the outcome of injunction hearings in the United States Court for the Eastern District at Milwaukee, Wis., last week. Judge F. A. Geiger made permanent a temporary injunction enjoining directors of the Northern company from interfering in any way with the sale of the company's stock to Mr. Newton to enable him to obtain majority control.

After it was pointed out by Paul V. Cary, trustee for the Patten company, that the contemplated sale of 40,000 shares of Northern stock held by the Patten company, Mr. and Mrs. Rosebush and the Western Ontario Land Company would bring $16 a share if it conveyed the control, thus to effect reorganization of the Patten company under section 77B of the national bankruptcy act, without loss to the stockholders, Judge Geiger ordered the permanent injunction.

"Unless the trustee of the Patten company can take advantage of this proposition, there is little hope of the company carrying out any 'appealing' reorganization plan," Judge Geiger said. "The court should think of the debtor's plight and what is to be done to carry out the liquidation of debts. I lay aside any consideration of the race for stock of the Northern company. The court ought to be liberal in aiding the trustee to protect the substantial phases of the contract."

The right of the Northern company directors to sell stock owned by Mr. Rosebush which he had given as collateral on loans of $300,000 from the company was defended by Joseph V. Quarles, counsel for directors of the Northern. He said approximately $250,000 was realized from the sale, understood to have been made at $5 a share, and now set aside by the injunction.

R. M. Graves, Wisconsin Rapids, Wis., attorney for Mr. and Mrs. Rosebush, pointed out that these two persons had contributed one and a half million dollars from their personal funds to the Northern company, and if this had not been done, there would be no Northern company today.

Harold Wilkie, of Madison, Wis., another attorney for the Northern, charged that Mr. Newton, the proposed purchaser, was a figurehead for Mr. Rosebush, who intended to regain control. Attorneys representing Mr. Newton filed an affidavit that he was not connected with Mr. Rosebush but represented three Chicago financial syndicates who will furnish the $640,000 needed to buy the controlling interest.

New Machinery Demonstration

Approximately sixty paper manufacturers and machine builders of the Fox River Valley and vicinity attended a demonstration at Valley Inn, Neenah, Wis., last week of miniature machinery on which William C. Nash, retired manufacturer and inventor of note of Neenah, has patents pending. It is said the improvements he has perfected will mark another important advance in paper manufacture.

His new machinery designs are for the Fourdrinier wet end. He displayed various types of guides of new design used in conjunction with his previously patented flexible tube roll arrangement. It is claimed that the Nash flexible tube roll arrangement prevents pressure and vacuum at the tube rolls and results in better formation of the sheet at a greater speed. It also provides better retention of filler, and two-sided sheet of paper with less wire marks and pinholes. The tender web will not be floated or flaked when first formed, it was stated.

The guide that drew greatest interest was the one designed to take advantage of present paper machine construction, and gives more forming surface without lengthening the wet end. It was pointed out that this new arrangement, using the Gilbert and Nash automatic guide and stretch roll, will give an added length of four to five feet to the wire without increasing the wire length.

Westbrook Steele to Study European Methods

European equipment and methods will be studied by Westbrook Steele, executive secretary of the Institute of Paper Chemistry, Appleton, Wis., in a three weeks' tour. He sailed last week from New York aboard the Cunard-White star S. S. Majestic.

Traveling largely by air, Mr. Steele will visit the following in England: Battersea and Chelsea Polytechnic Institute, London; Bowater's Paper Mills, Ltd., North Fleet; Gravesend, Kent and the Ayrsome, Lancashire research laboratories. He will also visit the French school of papermaking at Grenoble, and will include in his tour of the continent the papermakers' school at Altenburg, the institute for cellulose chemistry of the technical college of Darmstadt, the institute of technology at the University of Dresden, the experiment station for wood and pulp chemistry at Eberswalde, the institute of paper technology of the technical college at Koethen, and the forestry school at Tharandt. Mr. Steele will observe their equipment, libraries, personnel, research program, publications, and the manner in which their contributions to industries are used to the benefits of industry.

This inter-visitation is reciprocal, as evidenced by reports showing that during the past 1,307 executives of paper associations and members of foreign commissions to the United States visited the Institute of Paper Chemistry. Last week the Institute had as guests three executives of Albert E. Reed Company, Ltd., London. They were L. G. Cottrall, chief chemist, H. H. Watson, paper superintendent, and S. E. Hopper, engineer.

Mr. Steele will spend approximately three additional weeks visiting similar American institutions before returning to the Institute.

Paper Request Fairly Persistent In Toronto

Demand for Most Grades of Fine Paper Moderately Active—Coarse Paper Industry Experiences Slight Improvement—Transportation Adversely Affected by Intense Severity of Weather—Manufacturing Operations Maintained At Fairly High Level

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., February 10, 1936—The intense severity of the weather, with its consequent upsetting of transportation, has had the effect of slowing down the wholesale paper business. Most of the Ontario paper mills do their delivering throughout the province by truck and despite the fact that the main highways were kept open, orders from the printing and publishing trades were very hard to fill. However, it is argued, the business is there, and will reach the paper merchants as soon as they can guarantee prompt delivery. Up to the time the rough weather set in, at the end of January, or earlier, sales of paper were on a satisfactory basis despite the fact that most businesses had entered on their annual stock-taking and inventories were being taken preparatory to annual meetings. At the moment there is quite a fair demand for most classes of fine papers and there has been some slight improvement in the coarse paper market. Both the printing and publishing trades are picking up to some extent, and this is reflecting better business in the paper trade generally. Manufacturing operations are being maintained at a fairly high level and most of the plants see good business ahead.

40,000 Cords for Pine Falls Mill

Settlers in the wooded areas of Manitoba will earn $300,000 this winter by cutting 40,000 cords of pulpwood for the Manitoba Paper Company, Pine Falls, Manitoba, the Hon. J. S. McDiarmid, Minister of Natural Resources, stated this week. Assurance that these orders would be placed was given Mr. McDiarmid in Toronto by G. T. Clarkson, receiver for the Abitibi Power Corporation, which controls the Manitoba mill. Mr. McDiarmid saw Mr. Clarkson in the interests of getting the second machinery unit at Pine Falls into operation, thus providing more employment at the mill and larger wood orders from settlers. But the company was not prepared to extend operations at the present time. Increased production would have to be absorbed by markets outside Manitoba, it was stated.

Mr. McDiarmid admitted, however, he still was hopeful of getting the second unit at the mill into production, and would make use of every opportunity in that direction. There was satisfaction in the fact that practically an entire town had been taken off relief when the mill went into operation on a second unit basis last July. At the present time it is understood 45,000 cords, enough for a year's production, are on hand at Pine Falls.

Paper Firm Again Alters Name

British-American Pulp and Paper Mills, Ltd., Prince Rupert, B. C., has changed its name as of January 9, 1936, to Canadian-American Pulp and Paper Mills, Ltd., according to a notice in the British Columbia Gazette. The company's original name was Mutual Pulp and Paper Mills, Ltd., which was changed to British-American, and now to Canadian-American. The company was formed to acquire docks and power plant at Prince Rupert from the Dominion Government. Plans are under way to erect a mill to produce bleached sulphite pulp at an ultimate capacity of 500 tons a day. Construction is to start within a few months. Frank L. Buckley, Vancouver, is managing director.

Hinde & Dauch Hold Annual Meeting

Meeting in annual gathering in Toronto this week, Hinde & Dauch Paper Company revealed a satisfactory year's operations. Net earnings of $664,437 were shown in the year ended December 31, 1935, as compared with net earnings of $546,400 in 1934 and $344,123 in 1933.

After providing for depreciation and bond interest and taxes, there is a net profit $413,123 available for dividends. This is equal to $1.17 per share on the 299,933 shares of common stock outstanding and compares with 79.7 cents in 1934.

Working capital has been increased to $1,141,942 from $917,050. Cash and call loans are up to $457,585 from $325,188; inventories are up to $497,962 from $382,010, while receivables are down to $301,643 from $358,835. In addition to the improvement in working capital, non-current investments have been increased to $87,529 from $40,558 and fixed assets at $4,989,214 show an increase of $28,200.

Depreciation reserve against fixed assets now stands at $2,183,152. First mortgage bonds outstanding have been reduced by $51,500 to $1,175,500. Appraisal surplus has been reduced to $408,974 from $474,220 and earned surplus is up to $1,358,828 from $1,171,409.

Corrugated Paper Re-Financing

Shareholders of the Corrugated Paper Box Company have approved a plan for issuing arrears certificates for $33.25 to each preferred share, representing dividends accumulated on the stock. An amendment to the original plan was adopted, providing that no dividends may be paid on common shares while any arrears certificates are outstanding. About 70 per cent of the outstanding preferred shares were represented at the meeting and only one dissenting vote was cast.

Taggart-Oswego Plant Reopens

OSWEGO, N. Y. February 8, 1936—Announcement is made here that the plant of the Taggart-Oswego Paper and Bag Company will be reopened next week with day and night schedules. Several months ago the company decided to resume operations when it was announced that extensive repairs would be made. Since then miles of pipe lines have been overhauled, the machinery tested and other improvements made. The initial product to be turned out will be nine-point board and later on paper for the grocery and wrapping trade will be concentrated upon. It is also planned to produce kraft paper. It is said that orders are already booked which will guarantee steady operations for some time ahead. The decision to operate with three shifts of eight hours each was reached because of the number of orders on hand and it is understood that about 75 hands will be employed. A portion of these men have been on the payrool for several weeks placing the plant in condition. The bag plant is housed in the same building with the paper unit and has been operated during the years when a surplus of kraft production forced the closing of the Taggart-Oswego paper mill.

Outlook for Chicago Paper Industry Improves

Various Grades of Fine Paper Display Strength, Including Rag Content Papers and Ledgers—Sulphite Bonds Continue Steady—Demand for Paper Board More Active—Paper Stock Market Attracting More Mill Interest

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., February 10, 1936—While Chicago paper jobbers and sales representatives are laying plans to attend "Paper Week" during the middle of February, they are concentrating right now on a promotional drive which is being abetted by the general improvement in business. Most of the jobbing firms have a variety of new lines to occupy their attention and to provide material for promotional work.

Continued Improvement Expected

Marketwise, virtually all grades report a satisfactory condition which bids fair to improve from week to week. A wide range of orders, accumulating during inventory period, helped to strengthen the fundamental position of most grades. Kraft papers maintained their improved position with demand broadening out and affecting the kraft situation from pulp on to the finished product.

Bonds and ledgers reported a good week with sulphite bonds reported as steady and rag contents following a similar line. Paperboard offices were reporting increased demand with good possibilities for the future. Books and covers showed improvement over last week. Groundwoods continued to report an excellent comparative situation while newsprint sellers were watching increased advertising lineage with an interested eye despite continued lack of proper adjustment in the market. Waste papers were in better demand.

Preferred Discounts Discouraged

Paper merchants in Chicago are taking a great deal of interest in the campaign of the Illinois Federation of Retail Associations to discourage the practice of "industrial selling." The Federation reports that this activity is particularly prevalent in manufacturing and distributing concerns where employees—and their friends—are given "preferred discounts." To discourage the procedure which is helping to undermine retailing to an alarming degree, the Federation is not only asking retailers to directly contact their sources of reply and to ask for a cessation of this procedure but is also writing direct to manufacturers urging them to curb the practice of "discounts to employees" in their own plants.

The paper merchants in Chicago have recently engaged in the experiment of restricting the sale of retail quantities of paper to the logical avenue of the commercial printer when such paper is to be printed, all of which indicates a desire to cooperate with the program of the Federation to discourage so-called wholesale buying when such purchases should normally be made through the legitimate retailer.

News of the Industry

Local fiberboard firms were interested in the report that the United Kingdom-North Atlantic Steamship conference lines have just set up a rate arrangement which will enable importations of wines and liquors in fiberboard containers. Under the arrangement a non-contract rate to the seaboard ports of 92 shillings, 6 pence per 40 cubic feet and a contract rate of 77 shillings 6 pence will be levied. Other rates, including those quoted, and with respect to fiberboard containers will be applicable up to June 30, 1936.

The Swigart Paper Company is doing a considerable amount of promotional work on the new Hammermill Bond envelope made by the United States Envelope Company known as the "Self Seal Envelope." To seal, the user merely turns the lower flap up, presses the top flap down and the envelope is sealed. No licking is made necessary.

The southern ports foreign freight committee is giving consideration to the possibility of establishing a 20½ cent rate on woodpulp from gulf and southern Atlantic ports to Cincinnati. This follows the plan of the eastern trunk lines to make effective, February 1, a reduction to 20½ cents in the rate on imported and intercoastal woodpulp from Baltimore and Hampton roads to Miami valley points and Chillicothe. The proposed 20½ cent rate from south Atlantic and gulf ports is reported as not to be subject to emergency charges.

Ray Wantz, president of the Rockford Fibre Container Company, has been elected chairman of the board of the Illinois Manufacturers Association. For the past year he has been the president of this aggressive association which centers the majority of its activities on legislative affairs at Springfield and at Washington.

A spectacular 5-11 fire that started with a terrific explosion on the morning of January 28 virtually destroyed the five story structure occupied by the Midland Paper Company, prominent Chicago jobbers. The structure, located at 652 West Randolph street, was virtually demolished and the explosion injured at least one person and caused damages estimated at $150,000 by the Chicago Fire Department and at $100,000 by George A. Mueller, general manager of the Midland Company. The explosion blew out most of the front wall of the Midland plant on the second and third floors. A shipping clerk employed by Midland was injured by the blast. According to Mr. Mueller, the Midland Paper Company has taken a permanent location at 560 West Lake street and will utilize approximately 26,000 square feet of floor space in that building. Remodeling and improvement of the new location is already taking place and the Midland Paper Company will probably recover from the effects of the disastrous fire with the least possible loss of time and service to customers. An interesting sidelight on the situation following the fire was furnished by the way in which other Chicago paper jobbers immediately offered their services to the Midland organization. These competing firms offered unwatermarked stock and other services to permit Midland to continue business without any delay to customers.

John Schuber Leaves St. Regis

John Schuber has resigned his position as technical director of the St. Regis Paper Company, Deferiet, N. Y., effective March 1. Mr. Schuber was formerly with the Champion Fibre Company, Canton, N. C., where he did considerable research work on the kraft and bleaching processes for Southern wood pulps. Until March 1 Mr. Schuber may be reached at the St. Regis Inn, Deferiet, N. Y. He has made no immediate plans for the future.

Philadelphia Paper Upswing Well Sustained

Demand for Various Grades of Both Fine and Coarse Papers Holding Up Well for Season—Book Paper Manufacturers Restore Price Schedules to Last Year's Levels—Zero Weather Curtails Collections of Waste Paper, Thereby Creating Scarcity

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., February 10, 1936—All the uncertainties which have developed this past week in the way of currency inflation, etc., have failed to lessen the upswing which has been maintained in both fine and coarse divisions of the paper trade here; it is safe to say, however, that these uncertainties are limiting the speed of improvement in business.

The local fine paper trade was thrown into a state of confusion during the month by the unexpected announcement of several leading book paper manufacturers who had advanced their contract prices on coated and uncoated book and offset papers at the beginning of the year, that they had lowered their schedules to the same level that prevailed last year. Coming out of a clear sky without apparently any warning even to the larger dealers, the trade was in a state of chaos for several days.

Leading members of the local fraternity expressed themselves as at a complete loss to understand why an action of this kind should be taken at a time when there was an increasing volume of sales, and a great many inquiries—all pointing to very satisfactory business during February and March, which traditionally are the largest months of the year in book paper sales.

A number of amusing incidents are reported in the trade wherein printers by usual grapevine methods had received advices that book paper prices were changed, hastily placed orders with paper houses in the mistaken opinion that prices were being advanced. When it was learned that the prices, on the contrary, were being reduced, there was celebration on the printers' part because of the windfall which unexpectedly came to them in the form of larger profit on jobs estimated and sold on the old basis. The eventual result is hard to foresee at the present time.

There seems to be a great deal of dissatisfaction in the trade, some merchants looking ruefully at the increased local and State taxes, in addition to pay roll assessments on account of social legislation at Washington, and are wondering where all of these readjustments are going to lead them.

In the waste paper industry, merchants state that there is a good demand for stock but the recent zero weather has seriously curtailed collections, thereby creating a scarcity; all the stock that is available being absorbed by the mills.

Association Activities

A meeting of the Fine Paper Division of the Paper Trade Association of Philadelphia was held at the Down Town Club, on Friday, February 7. Ormond Freile, vice-president in charge, presided. Among other business was the re-election of Harry F. Donahue, of the Bolten Paper Company, as representative for the Division to the Executive Board of the Typothetae.

The appointments by the Board of Governors of the Philadelphia Paper Trade Association of Norbert A. Considine as delegate of the Fine Paper Division, and Nathaniel Saxe, delegate of the Coarse Paper Division to the National Board, were unanimously confirmed during the month.

E. K. Lay, vice-president of the Philadelphia Paper and Cordage Association and chairman of its Entertainment Committee was the recipient of a Thomas fly rod, known as the Codman prize, valued at $100, which was awarded to Mr. Lay by reason of his unexcelled proficiency in writing the best story of 700 words on "A Fishing Incident." Fifteen manuscrips were submitted, and Mr. Lay's was adjudged the best by Dr. Theo. M. Dillaway, Director of the Art Department in Philadelphia Public Schools, who examined the manuscripts presented. This was the occasion of the fifty-fourth annual dinner of the Pennsylvania State Fish and Game Protective Association on Wednesday evening, February 5, at the Penn-Athletic Club.

News of the Industry

At the regular meeting of the stockholders and board of directors of Paper Merchants, Inc., held last Thursday, the following officers were re-elected: W. Predmore, president; Ormond Freile, vice-president and manager of sales, and J. G. Seckle, secretary.

Moore & White are installing a 152-inch wide M. & W. Patent 4-drum winder and slitter parts in the Castanea Paper Mills, Lock Haven, Pa. This same company is also building a vertical type bleacher unit for thick stock for Pulp Bleacher Corporation, Orange, N. J., and are reconditioning paper machines for Patterson Parchmont Mills, Edgely, Pa.

James M. O'Neill, president of the Philadelphia Waste Merchants' Association announces that the association will hold its banquet in the Crystal Room of the Adelphia Hotel on Tuesday, February 25 at 6:30 P. M.

Scott Paper Company and subsidiaries report a net profit for 1935 of $938,754, after taxes and other charges, equal to $3.17 a share on 253,031 common shares. This compares with $905,757, or $4.53 on 168,868 shares in 1934.

Miami Mill Supply Co. Files Final Report

[FROM OUR REGULAR CORRESPONDENT]

DAYTON, Ohio, February 10, 1936—A final report was filed the past week in the Butler County Common Pleas Court at Hamilton by Attorneys Fred Cramer and Harry Dell, receivers for the Miami Mill Supply Company, Middletown, Ohio. Listing receipts of $3,529.33 and disbursements of $3,007.21.

The receivership resulted from a suit filed by Samuel Meizlish against Ben Blumberg and others.

Gould Paper Co. Elects Officers

LYONS FALL, N.Y., February 10, 1936—The annual meeting of the Gould Paper Company was held this week at which directors and officers for the year were chosen. The directors chosen included H. P. Gould, Walter Pratt, Gordon Gould and H. N. Haberer. Harry P. Gould was re-elected president and treasurer. Other officers elected included Walter Pratt, vice-president, and C. M. B. Williams, scretary and assistant treasurer.

New President of the International Paper Co.

R. J. Cullen Experienced Paper Manufacturer

Richard J. Cullen, who last week became president of the International Paper Company, first became identified with the paper industry in 1903, when he designed and constructed the Hawkesbury, Ont., bleached sulphite pulp mill, now owned by Canadian International Paper Company. This plant has since been in successful operation.

Some years later, Mr. Cullen saw the possibilities of manufacturing kraft pulp and paper in the Southern States and in 1918 became financially interested in Louisiana Fibreboard Company of Bogalusa. He built the company's mill and operated it as vice-president and general manager until it was purchased by the Great Southern Lumber Company.

In 1919, he became associated with John I. Beggs of Milwaukee, who for many years was a leader in the power industry, and an important factor in the North American Company.

Mr. Cullen's First Venture in the South

Mr. Cullen's first venture in the South in which he was the leading spirit was the Century Roofing Company. The plant of this company which he built was located on the Industrial Canal in New Orleans and was later sold to the Richardson Company of Lockland.

He then organized Bastrop Pulp and Paper Company and designed and built the mill for the manufacture of kraft pulp and paper with a daily capacity of 175 tons. This mill was purchased by International Paper Company in 1925.

Following Bastrop, the mill of Louisiana Pulp and Paper Company was designed and built by Mr. Cullen. John I. Beggs was substantially interested in this undertaking. This plant, acquired by the International Paper Company early in 1927, produces kraft pulp and paper and cylinder linerboard and has a capacity of 250 tons a day.

Joins International Paper Co.

At the time of the purchase of the Louisiana mill, Mr. Cullen joined the International Paper Company. A subsidiary known as the Southern International Paper Company was formed and he became president. This company was succeeded by the Southern Kraft Corporation, also a division of the International Paper Company, and Mr. Cullen became its head.

The Southern Kraft Corporation then began a period of expansion which resulted in a great increase in its productive capacity. The Camden, Ark., mill, with a daily capacity of 250 tons, was designed and built by Mr. Cullen and completed early in 1928. A few months later the Moss Point, Miss., mill was purchased. This plant has a capacity of 175 tons a day.

The Mobile, Ala., mill, of a daily capacity of 275 tons and also designed and built by him, began production in the latter part of 1929. Shortly after this mill had been placed in operation the great possibilities of Fourdrinier sulphate board for manufacturing shipping containers became apparent to Mr. Cullen.

Designs and Builds Panama City Mill

This resulted in his designing and building the Panama City, Fla., mill, especially adapted to the production of kraft linerboard. Completed early in 1931, this plant is now producing 625 tons a day. During this period the Fourdrinier kraft liner production of Southern Kraft Corporation has risen from nothing to the present rate of approximately 350,000 tons a year.

In addition to having supervision over the manufacturing operations of these mills, Mr. Cullen also has charge of the sale of their products.

He became a vice-president of the International Paper Company in December, 1927, and was elected president of the Continental Paper and Bag Corporation in January, 1931. In May, 1935, there was added to his duties the management of manufacture of all mills of the International Paper Company and its subsidiaries with the exception of the Hawkesbury and Kipawa bleached sulphite pulp mills. Upon receiving these additional responsibilities, he immediately planned and began the modernization of all mills then placed under his authority and a large part of this work has now been completed.

Made a Director of International

Mr. Cullen became a director of the International Paper and Power Company on January 10 of this year, and a director of the International Paper Company four days later. He was elected president of the International Paper Company on February 4 and president of the International Paper and Power Company on February 11.

The efficient organization which Mr. Cullen has built and brought to perfection is a source of great pride to him. One of the maxims which he has ceaselessly instilled in those associated with him is the importance of full cooperation within the industry.

Edward M. Davenport Dead

BOSTON, Mass., February 11, 1936—Edward Means Davenport, 75, treasurer and former president of Spaulding & Tewksbury Company, box board dealers, passed away at his residence, 78 Morton road, Milton, Mass., early this morning. He had been in poor health for the last three months, although he came to his office about Christmas time. He was widely and favorably known in the trade.

Mr. Davenport was born in Dorchester, Mass., December 8, 1860, a son of Amasa and Abbie (Tolman) Davenport. After attending Dorchester schools, he entered the employ of Spaulding & Tewksbury Company as salesman. His territory included New England, the West and Canada. He gradually rose, becoming president about the year 1910. In 1925, he was chosen as treasurer, relinquishing his office as president.

An enthusiastic yachtsman, he had passed summers for the last forty years at Southwest Harbor, Me., where he owned a sail boat and was a member of the yacht club. Mr. Davenport was a Mason and a member of the Milton Club and the Boston City Club.

Besides his wife, he leaves a daughter by a former marriage, Mrs. Charles (Gretchen) Buckley of Philadelphia, and a brother, H. Winslow Davenport, of Quincy, Mass., a Boston leather merchant.

Private funeral services will be held Thursday.

Government Paper Bids and Awards

Washington, D. C., February 12, 1936—The Government Printing Office has received bids at 5.25 cents per pound for 17,900 pounds (100,000 sheets) of white antique book paper from the following: Paper Corporation of the United States; Barton, Duer & Koch Paper Company; Acer, Walsh & Co.; Mathers-Lamm Paper Company; R. P. Andrews Paper Company; Stanford Paper Company; Whitaker Paper Company; Cauthorne Paper Company; J. W. Butler Company; Reese & Reese, Inc.; John F. Post; and Bulkley-Dunton & Co.; J. R. Howarth & Company, at 5.6 cents.

For 2,000 sheets of red sulphite paper: Reese & Reese, Inc., at 7.24 cents; Tarentum Paper Mills, 8.11 cents and Mathers-Lamm Paper Company, 11.45 cents.

For 19,535 sheets, 2,784 pounds of 100 per cent rag ledger paper; Reese & Reese Inc., 28.55 cents per pound; and Barton, Duer & Koch Paper Company, 21.5 cents.

For 80 pounds (2,000 sheets) of glazed paper, red on one side; R. P. Andrews Paper Company, at $9.60 per M sheets; and Mathers-Lamm Paper Company, $11.70 and $13.50.

The following bids have also been received by the Printing Office for 5,000 sheets of 22 x 28, 4 ply red railroad board; Whitaker Paper Company, $27.94 per M sheets; Dobler & Mudge, $28.80; Reese & Reese, Inc., $27.94; Walker-Goulard-Plehn Company, $28.80; Virginia Paper Company, $28.80; Mathers-Lamm Paper Company, $28.80; Old Dominion Paper Company, $29.74; and J. R. Howarth Paper Company, $28.80.

Bids were received also for 2,000 sheets of 24 x 36 brown cloth lined paper as follows: Reese & Reese, Inc., at $141.00 per M sheets; Mathers-Lamm Paper Company, $143.78; Whitaker Paper Company, $140.00; R. P. Andrews Paper Company, $160.00; Barton, Duer & Koch Paper Company, $150.00; George W. Miller & Company, $145.00; Virginia Paper Company, $185.00; and J. R. Howarth Paper Company, 142.00.

Reese & Reese, Inc. will furnish the Printing Office with 17,900 pounds (100,000 sheets) of 33 x 43", 179 lbs., white antique book paper at 5.25 cents per pound, bids for which were received on January 31.

Paper Salesmen's Luncheon

What's Ahead for Business and the Paper Industry? This is the question that is in every thinking man's mind today. An unusual opportunity will be afforded to hear an able and authoritative discussion of this subject at the luncheon of the Salesmen's Association of the Paper Industry, at the Waldorf-Astoria, on Tuesday, February 18.

The principal speaker will be Dr. Theodore J. Grayson, Professor of Finance, Wharton School of Business, University of Pennsylvania. Dr. Grayson's subject will be "American Business—The Short and Long View."

In addition to being a Professor of Finance and an author of several books on this subject, Dr. Grayson is a corporation lawyer of distinction. He is secretary and treasurer of the New Jersey Public Utility Association, member of the American Gas Institute, member of the Educational Committee of the Philadelphia Chamber of Commerce and Director of the Evening and Extension Schools of the University of Pennsylvania. Dr. Grayson is fully qualified to discuss the problems of industry from a sound businessman's point of view. He is an able speaker with a keen sense of humor, accustomed to addressing groups of business men.

Frank J. Sensenbrenner, president of the American Paper and Pulp Association, and George H. Mead, chairman of the Business Advisory Council of the Department of Commerce, have been invited to attend the luncheon and to make brief addresses. Other interesting features have been arranged by the committees for the entertainment of those attending the luncheon. Every effort will be made to complete the luncheon programme by 2:00 o'clock, in order not to delay the various association meetings scheduled for Tuesday afternoon. To this end, everyone is urged to get into the banquet hall promptly at 12:15.

The Salesmen's Association annual luncheon is one of the biggest events of Paper Convention Week, attended each year by the rank and file of the Paper Industry, including presidents of companies, sales executives, salesmen and their guests.

Boston Paper Industry Happenings

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., February 10, 1935—New book paper schedules and the increasing cost of deliveries, due to advances in trucking rates, were subjects discussed at the luncheon meeting of the Fine Paper Division of the New England Paper Merchants Association, held at the Boston Chamber of Commerce Thursday. Frank H. Winter, vice-president of the association in charge of the Fine Paper Division, presided.

A good delegation from Boston is expected to attend the convention of the National Paper Trade Association in New York February 17, 18 and 19.

Robert Francis Graham, well known in the paper stock trade as general manager of the Graham Corporation, large packers of waste paper, Roxbury, and Miss Mary Elinor Long, daughter of Mrs. Katherine Long, of Boston, were married Tuesday in Brookline.

W. J. Warner, vice-president of the Beveridge-Marvellum Company, Holyoke, Mass., was in Boston Tuesday, visiting Henry L. Goodman, distributor in New England for the company.

William G. Shortess, president of the Federal Paper Board Company, Inc., Bogota, N. J.; G. M. Wetmore, sales manager for the Claremont Paper Company, Inc., Claremont, with sales office in New York, accompanied by W. T. Libby, a salesman for the concern, and Benton C. Hill, Eastern sales manager for the American Coating Mills, Inc., Elkhart, Ind., with headquarters in New York, called on the trade last week.

Acquire Peerless Paper Box Mfg. Co.

Acquisition of the Peerless Paper Box Manufacturing Company and plant at Cleveland, Ohio, by Robert Gair Company, Inc., was announced yesterday. The business of the company will be carried on under the name of Gair Cleveland Cartons, Inc., with E. Victor Donaldson, president; L. H. Gaetz, executive vice-president; Fred Hashagen, vice-president and manager; W. F. Howell, secretary; Ernest Meyer, treasurer; and E. O. Sommer, comptroller.

Morart Paper Co. Elects Officers

HOLYOKE, Mass., February 10, 1936—The Morart Paper Company, Inc., held its annual meeting Monday, electing Maurice J. Moriarty president, Charles H. Barr, vice-president, and Charles F. Moriarty vice-president and general manager. A satisfactory year for 1935 was reported and a number of new foreign and domestic contracts noted. The company specializes in pliable decorative products and decorative paper.

Comparative Report Service Program

The following is the program of meetings for the Comparative Report Service of the American Paper and Pulp Association to be held at the Waldorf-Astoria Hotel, February 18-19, 1936:

FEBRUARY 18—TUESDAY 3:00 P. M.

Comparative Reporting Service General Meeting—Chairman: P. H. Glatfelter, President and Treasurer, P. H. Glatfelter Company.

What Information Does an Executive Need to Compete Successfully Under Present Business Conditions? Geo. W. Sisson, Jr., President, Racquette River Paper Company.

What Should I Expect for My Company from Comparative Data? L. C. Reynolds, Comptroller, American Writing Paper Company.

Stabilization of the Industry Through Comparative Cooperative Work. Chas. H. Sage, Kimberly-Clark Corp.

How Can Comparative Information be Obtained in Our Industry? D. C. Everest, Vice President, General Manager Marathon Paper Mills Company.

FEBRUARY 19—WEDNESDAY 10:00 A. M.

Comparative Reporting Service, Detailed Discussion of Reports and Procedure.

Paper Machine Hour Conversion Costs. L. C. Haughey, Assistant Comptroller, Mead Corp.

Paper Mill Furnish Efficiencies. C. M. Baker, Consulting Engineer.

Wood Pulp Conversion Costs. J. F. Hunt, Comptroller, Kimberly-Clark Corp.

Rag Pulp Conversion Costs. J. E. Barrett, American Writing Paper Company.

Steam Plant Efficiencies. Steam Plant Costs. Geo. D. Bearce, General Manager, Maine Seaboard Paper Co.

WEDNESDAY 1:00 P. M.

Buffet luncheon. $1.50 per plate.

WEDNESDAY, 2:30 P. M.

Meeting Comparative Reporting Service Committee. Development of Service.

All members of the industry are welcome.

Robert Johnston Dead

[FROM OUR REGULAR CORRESPONDENT]

NORFOLK, Va., February 8, 1936—Robert Johnston, aged 76, president of the Old Dominion Paper Company, and for many years prominently identified with business, fraternal, social and religious activities of the city, died last week at his residence, 502 Pembroke Avenue. He had been in failing health for some time, but up to a few days ago was thought to be improving.

Mr. Johnston, a former member of the Board of Control, was a native of Portsmouth. He had resided in Norfolk for the last 52 years.

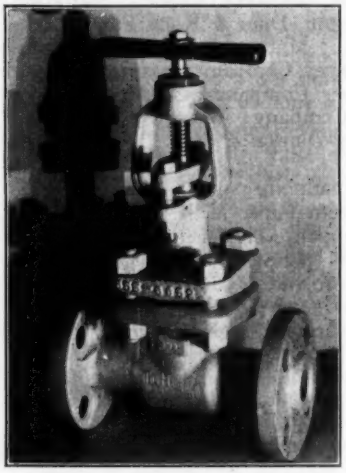
He was a member of the Rotary Club of Norfolk. He was connected with the Masonic fraternity. He had been active in the city life, at one time serving on the Charity Board, to which position he was appointed by City Manager Truxton in 1930.

Mr. Johnston was a member of the First Presbyterian Church. He was the son of the late Robert and Mrs. Augusta Young Johnston.

Mr. Johnston is survived by his wife, Mrs. Minnie Fuller Johnston; two daughters, Mrs. J. Warren White, Norfolk; Mrs. Joseph Taussig, wife of Admiral Taussig,, Washington, D. C.; two sons, Henry Alan Johnston, New York, N. Y., and Robert S. Johnston, of Norfolk; ten grandchildren, and one sister, Mrs. Calcott Pratt, of New York.

New Hancock Forged Steel Valve

A newly improved line of forged steel globe valves has been announced by the Hancock Valve Division of Consolidated Ashcroft Hancock Company, Inc., Bridgeport, Conn. These valves are made for pressure ratings up to 1500 pounds and are specially designed with a tongue-and-groove bolted bonnet for high temperature service.



These new valves are made in either cone or plug type and the valve seat ring and disc are made of heat-treated stainless steel. The makers claim that this trim material is exceptionally hard, and therefore resists wire drawing, indenting and galling and reduces repairs.

It is claimed the features of these Hancock valves include: all parts made of steel for safety against fire hazards, long condensation chamber protects and increases life of packing, all wearing parts are renewable, and that the seat ring is easily removed with a standard hex wrench. The makers further state that these valves are easy to repack in service because of a special stainless steel back seat, and because the gland bolts come completely out, allowing ample finger room and because of a relief plug for bleeding condensation chamber while repacking.

The many other distinctive features of these new forged steel valves are fully described in a new illustrated 20-page bulletin which may be obtained by writing the Hancock Valve Company, Bridgeport, Conn.

Concenco Spray Nozzle

The Concenco Spray Nozzle, made by the Deister Concentration Company, Fort Wayne, Ind., will, it is believed, find profitable application in the varied washing and liquid spraying requirements of the pulp and paper industry.

The Concenco Spray Nozzle offers highly effective results wherever controlled and definite application of water is desired. It delivers an unbroken sheet stream of good body and at proper working pressure for effective washing. It can be definitely aligned, makes a leak-proof connection, has the least chance of plugging up, and when necessary to be removed, can be replaced in a moment's time.

Its assembly is unique. No tapping is required. It is only necessary to drill an oversize hole and clamp the nozzle in place with the means provided for rapid and simple assembly. This allows perfect alignment of all nozzles when used in series on a spray pipe, thus delivering an unbroken sheet discharge to the point of application with all streams discharging in a common plane.

Conceno Spray Nozzles are furnished either cadmiun plated with brass connecting means or with brass nozzle head and brass connecting means. They are designed to fit 1-, 1¼- or 1½-inch spray pipe lines, and are furnished with discharge orifices $\frac{3}{16}$-, $\frac{1}{4}$-, $\frac{5}{16}$- and $\frac{3}{8}$-inch. An interesting folder may be obtained which gives capacity table and characteristics of sheet streams delivered.

E. E. Barrett Heads Pulp Importers

The Association of American Wood Pulp Importers experienced a very active year during 1935. Many matters of great importance were handled by the executive committee of the association and as a result of several meetings with domestic producers of wood pulp, understandings and arrangements were made which have generally reacted to the benefit of the Paper Industry in this country.

The annual meeting of the association was held at the Waldorf-Astoria Hotel on February 6, 1936. The retiring President, N. R. Johaneson, of Johaneson, Wales & Sparre, Inc., who had been the president of the association for the past two years, was honored by the members for the valuable work which he had accomplished during his two years in office.

As a token of the appreciation of his fellow-members he was presented with a magnificent desk, and further tribute was paid to him by a testimonial made a permanent part of the minutes and records of the association.

At this meeting a new regime of officers was elected for the current year, consisting of the following:

President, Edward E. Barrett, of The Mead Sales Company, Inc.

Vice-President, Carlton B. Overton, of Castle & Overton, Inc.

Treasurer, J. Allan Millar, of the Perkins-Goodwin Company.

Secretary, Seymour Hollister of The Mead Sales Company, Inc., 230 Park avenue, New York.

Board of directors, Messrs, Barrett, Overton, Millar, Hollister and Nils R. Johaneson, of Johaneson, Wales & Sparre, Inc., president of the association for the past two years.

Members of the association as of February 15, 1936, follow:

J. Andersen & Co., Atterbury Brothers, Inc., Borregaard Company, Inc., Bulkley, Dunton & Co., Castle & Overton, Inc., Fraser Industries, Inc., Johaneson, Wales & Sparre, Inc., Lagerloef Trading Company, Inc., Mead Sales Company, Inc., Pagel, Horton & Co., Inc., Parsons & Whittemore, Inc., Perkins-Goodwin Company, Price & Pierce, Ltd., E. M. Sergeant Pulp and Chemical Company, Inc., Stora Kopparberg Corporation.

Whiton Steam Turbines

The D. E. Whiton Machine Company has just issued a handsome and very interesting new catalog of its line of steam turbines. In the foreword to the catalog it is stated: "For many years past, the D. E. Whiton Machine Company has built auxiliary steam turbines. Known originally as 'Lee Turbines,' they established a reputation for ruggedness, stamina, and freedom from repairs. With the establishing of field organizations, to eliminate confusion, these turbines have come to be known as Whiton turbines, hence the formal change of name.

"Whiton turbines have been constantly improved to keep pace with higher steam pressures and temperatures, and the regard in which they are held by nationally-known engineers, their general acceptance in a wide range of industries, and the repeat business from earlier users, proves their successful and satisfactory service.

"In this new catalog, illustrations and descriptions explain the construction of Whiton turbines. Our engineers in all principal cities are prepared to study your steam and power requirements and intelligently outline definite applications." Persons interested may receive a copy of the catalog free upon application to the D. E. Whiton Machine Company, New London, Conn.

MAY REVISE PULPWOOD PRICES

(Continued from page 13)

put into operation an additional machine to manufacture folding box boards of all kinds with a capacity of 30,000 tons per annum.

Lumbermen Meet

At the 28th annual meeting of the Canadian Lumbermen's Association, held in Montreal, W. R. Beatty, of Pembroke, Ont., president, reported that the three-fold effects of the Empire Trade Agreement, the recently signed trade pact between Canada and the United States, and the improvement in general business conditions are resulting in encouraging prospects for the lumber industry. He predicted firmer prices, but admitted that the local consumption of lumber had been very disappointing.

The Hon. Honore Mercier, Minister of Lands and Forests for the Province of Quebec, promised the assembly of lumbermen that the present reductions in stumpage dues would be maintained as an aid to industry although this action would mean less revenue for the provincial treasury.

R. L. Sargent, of Ottawa, in submitting his report as secretary-manager of the association, urged lumbermen to maintain prices when making sales to United States concerns, now possible because of the new trade agreement. Otherwise they might be accused of taking unfair advantage by dumping their lumber into the United States.

N. F. Blair, of Quebec City, was elected president for the ensuing year. Other officers elected were: First vice-president, K. S. Maclachlan, of Edmundston, N. B.; second vice-president, James L. Crane, of Thessalon, Ont.; honorary treasurer, R. G. Cameron, of Ottawa; and secretary-manager, R. L. Sargent, also of Ottawa.

Paper Demand Irregular In Boston

BOSTON, Mass., February 10, 1936—The volume of sales made by Boston paper merchants during the week continued fair, although it is stated that the severe cold weather has held up business to a considerable extent. This condition applies, naturally, to both fine and wrapping paper. Fancy papers were a bit quiet. Box boards were seasonally slow.

In paper stock, waste papers of all grades were firmer. Mixd papers and old newspapers remained at the same levels in Boston. The market, however, has advanced in New York, and it is expected that a similar rise will take place here very soon. Some special grades of old papers were in very active demand, such as corrugated boxes of all-kraft stock. Corrugated boxes advanced to .40 @ .35 from .35 @ .40. No. 1 kraft, New England packed, was also very active, rising to 1.15 @ 1.20 from 1.10 @ 1.15. No. 1 books, heavy, went up to .60 @ .70 from .55 @ .65.

New domestic rags were in good call. Domestic roofing rags seemed to be scarce, probably owing to the heavy fall of snow and zero weather, which interrupted collections. No. 1 roofing stock advanced 1.70 @ 1.80 from 1.60 @ 1.70, No. 2 grade to 1.50 @ 1.60 from 1.40 @ 1.50, and No. 3 to 1.20 @ 1.25 from 1.00 @ 1.10. Foreign rags continued steady. Bagging prices held their own.

Hamburg Wax Paper Co. Elects

The Hamburg Wax Paper Company, Hamburg, N. J., recently organized to operate a local mill, has elected the following officers: Reeve Harden, president; Robert L. Martenis, vice-president; C. C. Griggs, secretary, and Nicholas Farber, treasurer. In addition to the officers noted, the Board of Directors will include W. S. Cooke, George Perlee and Robert P. Crouch.

Bill To Tax Paper Products

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., February 12, 1936—The paper industry is considerably upset at the bill recently introduced in the House by Representative Ferguson of Oklahoma to impose taxes upon "the processing of certain agricultural commodities."

Strangely enough Mr. Ferguson has included in his bill certain paper products, which by no stretch of the imagination could be classed as "agricultural commodities." It is understood that hearings will be held on the bill by the House Ways and Means Committee some time in the next few weeks. Those sections dealing with paper products in the bill include the following:

"There is hereby imposed, upon the first domestic processing, respectively, whether of domestic production or imported, of each of the following-named commodities, a tax, to be paid by the processor, on and after the effective date of this section, as follows: * * * * * *

"(10) On paper—

"(A) when manufactured into coated paper bags, multiwall paper bags and all other paper bags, except open mesh paper bags, printed, labeled, or otherwise identified as bags designated and in form for use in the packaging of grain flours, corn meal, sugar, malt, fertilizers, feeds, or potatoes, of a sacking capacity of four and one-half pounds and over, and less than seventy-five pounds:

"(i) on four and five-tenths to five and four-tenths pound size bags, inclusive, a tax at the rate of $1.24 per thousand bags produced;

"(ii) on five and five-tenths to seven and nine-tenths pound size bags, inclusive, a tax at the rate of $1.47 per thousand bags produced;

"(iii) on eight to ten and nine-tenths pound size bags, inclusive, a tax at the rate of $2.02 per thousand bags produced;

"(iv) on eleven to twelve and nine-tenths pound size bags, inclusive, a tax at the rate of $2.25 per thousand bags produced;

"(v) on thirteen to sixteen and nine-tenths pound size bags, inclusive, a tax at the rate of $3.11 per thousand bags produced;

"(vi) on seventeen to twenty-nine and nine-tenths pound size bags, inclusive, a tax at the rate of $3.96 per thousand bags produced.

"(vii) on thirty to seventy-four and nine-tenths pound size bags, inclusive, a tax at the rate of $7.91 per thousand bags produced.

"(B) when manufactured into paper towels, a tax at the rate of 0.346 cent per pound, weight of paper.

"(C) when manufactured into gummed paper tape, a tax at the rate of 4.06 cents per pound, weight of paper.

"(11) On open mesh paper fabric—

"on open mesh paper fabric, when manufactured into open mesh paper bags, a tax at the rate of 2.14 cents per pound, weight of open mesh paper fabric.

"(12) On reinforced paper fabric—

"on reinforced paper fabric, when manufactured into reinforced paper fabric tape, a tax at the rate of 21.7 cents per thousand one-inch yards of reinforced paper fabric tape, except that, if in any case the reinforced paper fabric tape has any cotton content, the tax per thousand one-inch yards of such reinforced paper fabric tape shall be that amount by which 21.7 cents exceeds the amount of the tax paid in the production of the cotton content.

New TAPPI Members

The executive committee of the Technical Association of the Pulp and Paper Industry has elected the following to membership:

Thomas E. Button, Chemical Engineer, Missisquoi Corporation, Sheldon Springs, Vt., who was formerly chemist for the Oswego Falls Corporation, Fulton, N. Y. and the New Haven Pulp and Board Company, New Haven, Conn.

William F. Connolly, Student, New York State College of Forestry, Syracuse, N. Y., was formerly a paper tester at the Defiance Paper Company, Niagara Falls, N. Y.

Nelson C. Cooper, Technical Sales, R. & H. Chemicals Department of E. I. du Pont de Nemours, Inc., Wilmington, Del., has been transferred to Active membership. Mr. Cooper is a 1922 graduate of Queens University and was formerly with the Electro Bleaching Gas Company.

Trygve Iversen, Kraft Mill Superintendent, Pacific Mills Ltd., Ocean Falls, B. C., is a graduate of Carolinska Larovarket, Orebro, Sweden, and was formerly Superintendent of the Brown Corporation, La Tuque, P. Q., Wayagamack Company, Three Rivers, P. Q., Queensland Pine Company, Barramna Creek, Queenslands, Australia; Dryden Pulp Company, Dryden, Ontario, and the Vancouver Kraft Company, Port Mellon, B. C.

B. L. Kassing, Paper Mill Superintendent, Hammermill Paper Company, Erie Pa., is a 1923 graduate of the New York State College of Forestry.

E. Russell Lang, Student, New York State College of Forestry, Syracuse, N. Y., was formerly a control chemist at the Diamond Mill Paper Company, Saugerties, N. Y.

Robert S. Lee, Victoria, B. C., is a graduate of the Sunderland Government School, Sunderland, England, and was formerly Superintendent of the Pacific Mills, Ocean Falls, B. C.

John G. Strange, Assistant Executive Secretary, Institute of Paper Chemistry, Appleton, Wis., is a 1932 graduate of Lawrence College, Appleton, Wis., and was secretary of the Central Grading Committee of the American Paper and Pulp Association, New York.

Edgar Turnbull, Technical Director, Knowlton Brothers, Watertown, N. Y., has been transferred to Active membership. Mr. Knowlton is a graduate of the New York State College of Forestry and was formerly with the J. P. Lewis Company of Beaver Falls, N. Y.

American Writing Reorganization

BOSTON, Mass., February 10, 1936—At the hearing today before the District Court of the United States for the District of Massachusetts in the Federal Building for the purpose of considering the plan of reorganization proposed by the American Writing Paper Company, Inc., under Section 77B of the Bankruptcy Law, Judge McLellan stated that in view of a recent decision in the Circuit Court of Appeals for the First Circuit, it was not competent at this time for him to pass on the fairness or feasibility of the plan.

He did, however, listen to comments by attorneys representing bondholders and stockholders and creditors and indicated that he would at a later date enter an order in which he would find that the plan as presented complies with the provisions of Sub-division b of Section 77B and direct that creditors and holders of the securities of the company and others concerned should have an opportunity to file with the company their acceptances of the plan, the precise form of the order to be determined after it has been submitted to counsel for the various parties appearing at the hearing.

CONSTRUCTION NEWS

A Summary of Vital Facts Regarding Construction, Finances and Operation of Paper Mills

Construction News

Cleveland, Ohio—The Dobeckmun Company, 3301 Monroe avenue, manufacturer of cellophane bags, wrappers and other containers, has filed plans for new addition to converting plant, for which superstructure will begin at once. It will be one and two-story, 115 x 120 feet, estimated to cost close to $70,000, with equipment. General building contract has been awarded to the Bison Company, 12406 Marston avenue. George S. Rider Company, Marshall Building, is architect and engineer.

Sebring, Ohio—The H. Bettis Company, Lincoln avenue, Zanesville, Ohio, manufacturer of corrugated paper boxes and containers, has arranged for the establishment of a new branch manufacturing plant at Sebring. A warehouse building on Twelfth street, heretofore occupied by company for storage and distribution in the Sebring district, will be remodeled and improved, with installation of necessary machinery. Sizable capacity will be carried out at new location. J. L. Mahle is president.

Lynchburg, Va.—The Jno. H. Heald Company, manufacturer of laminated and other paper board products, has work in progress on an expansion and improvement program for large increase in capacity, and will push the project to early completion. The development has been under way for a number of weeks, and was previously referred to in these columns. Installation will include a new paper board machine with rated capacity of about 75 tons in 24 hours, and will advance mill rating to 200 tons of material per day. A new paper processing unit will be provided, with installation to include a breaker-beater, screening and other refining equipment. Entire project will represent an investment of close to $500,000. Sydney Ferguson is vice-president.

Chester, Pa.—The Scott Paper Company, manufacturer of tissue paper stocks, is arranging for an increase in capital from 300,000 to 1,000,000 shares of common stock, no par value, and from 141,599 shares of $100 preferred stock to 150,000 shares. T. B. McCabe is president.

Northumberland, N. H.—The Forest Products Association, Inc., recently chartered under state laws to operate in the pulpwood industry, has concluded arrangements for a Federal loan of $100,000 to carry out a proposed project. Work will include the cutting of timber and pulpwood preparation for raw material supply to paper mills, and will be placed under way as soon as weather conditions permit. The organization has a membership of more than 200 persons.

Baltimore, Md.—The Maryland Paper Products Company, 1200 South Eutaw street, has concluded arrangements for taking over part of former plant of Knabe Piano Company, known as unit No. 1, bounded by Eutaw, West, China and Cross streets, and will remodel and improve for new plant. Expansion program will be carried out, with installation of additional equipment for increased capacity. It is proposed to have the structure ready for service at early date.

Niles, Mich.—The Simplicity Pattern Company, manufacturer of paper patterns, affiliated with the North American Pulp and Paper Corporation, Cheboygan, Mich., has awarded general contract to Williams Brothers, Niles, for new addition to paper converting plant. It will be one-story, reported to cost over $60,000, with equipment. Improvements will be made in present factory, for which contract has been let to the same company. Work will be placed under way at early date. Company has also leased a floor in building at 343-61 Fourth avenue, New York, N. Y., and will occupy for executive offices.

New York, N. Y.—The Watertown Board Mill, Inc., recently organized under Delaware laws with capital of 1000 shares of stock, no par value, has filed notice of company organization to operate in New York for the manufacture of paperboard, boxboard and affiliated products. New York office will be at 155 East 44th street. E. Victor Donaldson is president. New Company will be associated with the Robert Gair Company, Inc., same address, of which Mr. Donaldson also is head, and it is understood will operate in conjunction with last noted company at its Watertown, N. Y., mill.

Lee, Mass.—Smith Paper, Inc., is completing revised plans for new additions to mill, recently referred to in these columns, and will place general contract in near future, carrying out erection early in the spring. Main extension will be one-story and basement, 146 x 160 feet, with one-story adjoining unit, 125 x 130 feet, and will be used for expansion in machine department and finishing division. Entire project is reported to cost over $100,000, including equipment.

Greenville, Miss.—The United States Gypsum Company has plans for new addition to insulating board mill at Greenville, to be one-story, 150 x 230 feet, equipped for large increase in present capacity. Bids have been asked on general contract and it is proposed to begin work on superstructure at early date. New unit is estimated to cost close to $150,000, including equipment. Company headquarters are at 300 West Adams street, Chicago, Ill., Engineering department is in charge.

Hartford, Conn.—The Sterlite Fibre Products, Inc., recently organized with capital of $50,000, plans operation of local plant for the manufacture of paper and fiber products, including containers, etc. Incorporators of new company include Robert F. Lewis, 2159 Hudson boulevard, Jersey City, N. J., and Robert L. Cookingham, 2418 Kenmore place, Brooklyn, N. Y.

Crossett, Ark.—The Crossett Lumber Company has plans nearing completion for proposed new local pulp and paper mill, referred to in these columns a number of

months ago. New mill will comprise several units, with steam power station, machine shop and other mechanical departments, and will be used for the production of kraft paper stocks. It is estimated to cost about $4,000,000, with machinery, for which amount the company has concluded arrangements with RFC for loan. Company engineering department is in charge of project.

Huntington, W. Va.—A new one-story addition for paper-converting service will be constructed by the McKenny Preserving Company, West Sixth street and Jackson avenue, to be used for the production of paper labels and allied paper goods used by the company for its regular food products. Plans are being completed and it is proposed to begin work soon.

New York, N. Y.—The Bilt-Rite Box Corporation, 330 West 38th street, manufacturer of paper boxes and containers, has space in building at 242 West 41st street, including main floor, second floor and basement, and will occupy for local plant, removing present establishment to new location. Portion of acquired property will be used for storage, distribution and general offices.

Rimouski, Que.—The Ontario Paper Company, Ltd., Thorold, Ont., manufacturer of news print, is having preliminary plans prepared by J. Stadler, 1117 St. Catherine street West, Montreal, Que., consulting engineer, for proposed new mill in Comeau Bay district, near Rimouski, where large tract of land has been secured. Plant will comprise a number of large operating units and will include a hydro-electric power development for mill service. Company will make investment reported over $6,000,000 in project, which will require about 12 months for completion. Company is affiliated with the Chicago Daily Tribune, Chicago, Ill., and New York Daily News, New York, N. Y.

New Companies

New York, N. Y.—The Arrow Paper Company, Inc., has been incorporated with capital of 100 shares of stock, no par value, to manufacture and deal in paper goods. The incorporators include Herbert A. Flechner, 516 Monroe street, Brooklyn, N. Y. Company is represented by Rees & Kessel, 50 Court street, Brooklyn.

Green Bay, Wis.—The Textilose Company has been organized to manufacture and deal in cellulose, pulp and paper products of various kinds. The incorporators include W. L. Evans, F. O. Merrill and F. L. Stinson, all of Green Bay.

Kansas City, Mo.—The Woodland Printers and Kodapak Bag Manufacturers, Inc., has been chartered to manufacture and deal in paper bags and containers of various kinds. The incorporators are Louis Zinsen and Frank Wilson, 8201 Brooklyn street, Kansas City. Last noted is company representative.

New York, N. Y.—Roskin-Calodney & Co., Inc., has been incorporated with capital of 100 shares of stock, no par value, to manufacture and deal in paper products of various kinds. The incorporators include Samuel Roskin, 19 Tompkins avenue, Brooklyn, N. Y., and F. Korn, 868 Fox street, Bronx, New York.

New York, N. Y.—The Metropolitan Paper Converters-Machine Company, Inc., has been organized with capital of 100 shares of stock, no par value, to manufacture and deal in paper-converting machinery and parts The incorporators are John A. Mattera, 32-85 Thirty-third street, Astoria, L. I., and Harry P. Shea, 718 South street, Bellmore, L. I.

New York, N. Y.—Pulp Specialties, Inc., has been incorporated with capital of $20,000, to manufacture and deal in pulp and paper products of various kinds. The incorporators include J. I. Golinko, 1776 Broadway, and Joseph Shea, 30 Rockefeller Plaza, both New York. Last noted is company representative.

Wilmington, Del.—The Sho-Rap Corporation has incorporated under State laws with nominal capital of $1000, to manufacture and deal in paper products of various kinds. The incorporators include L. H. Herman, W. T. Hobson and Walter Lenz, all of Wilmington. New company was organized under direction of the Corporation Trust Company, Industrial Trust Building, Wilmington.

New York, N. Y.—The Waters Machine Company, has been chartered with capital of $20,000, to manufacture and deal in paper boxes and containers, and paper box-making machinery. The incorporators are Lewis B. McCabe, Jr., 114 East Thirty-second street, VanBuren Taliaferro, 230 Park avenue, both New York; and Marshall Waters, 601 Harvey street, Green Bay, Wis. Last noted will head new organization.

Chicago, Ill.—The Kupfer Brothers Paper Company, 135 West Austin avenue, has been chartered with capital of 400 shares of par value stock, to deal in paper products of various kinds. The incorporators include Alfred G. Johnston, Otto C. Bruhlman and Elmer Engquist.

Detroit, Mich.—The American Fiber Products Company, 1610 Gillett street, has been organized with nominal capital of $7500, to manufacture and deal in fiber products of various kinds. Samuel Levine, 1580 Dallas avenue, Detroit, is principal incorporator.

Springfield, Mass.—The Riverside Paper Corporation has been incorporated under state laws with capital of 1000 shares of stock, no par value, to manufacture and deal in paper goods. Edward L. Fenton is president, and Burleigh A. Annable, Wilbraham, Mass., treasurer and representative.

New York, N. Y.—The Wynne Paper Products, Inc., has been incorporated with capital of $20,000, to deal in paper products of various kinds. Prentiss D. Wynne, 443 Powell avenue, Newburgh, N. Y., is principal incorporator and head. Albert Bernstein, 119 West Fortieth street, New York, is another incorporator.

Interlake Tissue Mills Join TAPPI

The Interlake Tissue Mills Company, Ltd., of Merritton, Ont., has become a corporate member of the Technical Association of the Pulp and Paper Industry. As a result of excellent management, and having a good product, Interlake has acquired an enviable reputation in its field, namely in the manufacture of decorative crepe, napkins, towels, toilet, M. G. and M. F. tissues, light weight wrappings, waxing and dry-proof papers.

The company will be represented in the Technical Association by its president, George Carruthers, whose sympathetic interest in the work of the Technical Association in the United States and the Technical Section in Canada, has greatly encouraged these organizations.

Ohio TAPPI To Meet

The Ohio Section of the Technical Association of the Pulp and Paper Industry will meet on Friday evening, February 21, at the Manchester Hotel, Middletown, Ohio. Dinner will be served at 6:30 p. m., and the meeting will be called at 7:45 P. M.

Dr. C. E. Curran, in charge of the Section on Pulp and Paper at the Forest Products Laboratory, Madison, Wis., will talk on "New Viewpoints on Old Problems."

Any one interested in the pulp and paper or affiliated industries will be welcome at this meeting. Dinner reservations should be made with Carl D. Roess of the Wrenn Paper Company, Middletown, Ohio.

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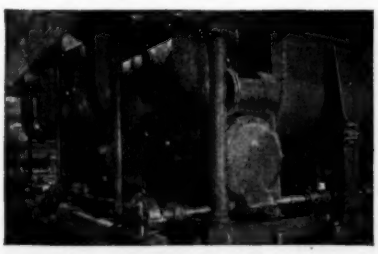
BIRD  SCREENS

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COMING EVENTS IN THE PAPER INDUSTRY

AMERICAN PAPER AND PULP ASSOCIATION, Fifty-Eighth Annual Convention and Meeting, Waldorf-Astoria Hotel, New York, February 17-21.

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, Convention, Waldorf-Astoria Hotel, New York, February 17-20. Annual Luncheon, Waldorf-Astoria Hotel, Thursday, February 20.

SALESMEN'S ASSOCIATION OF THE PAPER INDUSTRY, Annual Meeting and Luncheon, Waldorf-Astoria Hotel, New York, Tuesday, February 18.

NEW YORK ASSOCIATION OF DEALERS IN PAPER MILL SUPPLIES, Annual Banquet, Hotel Commodore, New York, February 19.

NATIONAL PAPER TRADE ASSOCIATION OF THE UNITED STATES, Convention, Waldorf-Astoria, New York, February 17-21.

URGES FUNDED RESERVES

Inadequate reserves to care for depreciation, obsolescence or expansion are the principal causes of business failures, Challiss P. Gore asserts in his new book: "The Ghost in the Balance Sheet," just published by the Scientific Press, New York City. He cites typical cases of manufacturing and retail operations which came to grief by regarding depreciation as a "bookkeeping item" instead of a funding requirement. Mr. Gore is author of "The Forgotten Fifty Billions" published early this year.

"Under the custom of treating reserves only as a 'bookkeeping item,' business enterprises suffer all the way from inconvenience to actual loss, and in extreme cases become bankrupt," warns Mr. Gore. "And this, notwithstanding the fact that the balance sheet, if merely looked at instead of analyzed and interpreted, may appear to reflect a healthy condition."

Unless a business maintains a special reserve fund the capital that should go into reserves goes into inventory, dividends, debt reduction, etc., often bringing about instability to the financial set-up of the business. That is true of both large and small businesses, Mr. Gore points out. He advocates the creation of segregated reserves through trust funds administered by a national bank. Such funds show greatest growth because of compounded earnings and appreciation of the common stocks which comprise the portfolio of the trust. Some of such trust funds employ a little-known but effective principle of investment called actuarial buying under which investment of equal sums of money at regular intervals results in an acquisition cost below the average price which prevailed during the same period.

"When no special fund is maintained there are only eight places where money representing reserves can go: (1) cash; (2) receivables; (3) inventory; (4) expansion; (5) debt reduction; (6) dividends; (7) securities; (8) losses. In the average case it becomes distributed over several of these classifications, excluding, let us hope, losses.

"Suppose the reserve results in increased cash. If that creates too much cash, then the company has idle, or nearly idle, funds. If it needs the increased cash, it is being obtained at the expense of adequate plant and equipment maintenance.

"Increased receivables? They show that the company is either doing a larger business or is not keeping up its collections," continues Mr. Gore. "If the former is the case all the more reason to maintain adequate plant and equipment; the additional business should be financed in some other way.

"Larger inventories? Also a sign of a growing business—or speculation in commodities. An inventory larger than seasonal requirements begins to depart from the function of business and enters the realm of speculation.

"Expansion? When financed out of reserves, expansion becomes a form of pyramiding—calling upon original capital to do a larger job than was intended. Only so much business can be done safely with so much capital.

"Debt reduction? No one can question its desirability, but when employing depreciation reserves for this purpose, it should be remembered: The bank loans money on the basis of quick assets and earning power. Bank loans are made in anticipation of collecting accounts and liquidating inventories, not to be put into fixed assets such as plant and equipment. The lowering of long-term debt does not entitle a business to bank accommodation when it needs money with which to replace wornout or obsolete equipment. It is true that a mortgage or bond issue should be reduced as fast, or faster, than the mortgaged property deteriorates in value. But the use of the reserve for this purpose almost amounts to giving the property away piecemeal.

"Dividends? When a conservative depreciation policy results in an excess of cash there is a temptation to distribute the money in the form of an extra dividend. Not infrequently, bankers and accountants tell us, dividends originate at such a source. Such a dividend, in reality, is a return of capital, not a distribution of profits.

"Plant and equipment are fixed assets; merchandise, accounts receivable, etc., are current assets. It may not be a major operation to convert a fixed asset gradually into a quick asset by allowing depreciation reserves to gravitate into the upper bracket. But it becomes a major operation suddenly to convert quick assets into fixed assets, as would be necessary if substantial replacements could not be financed on credit or new capital."

The reserve fund of a business need not be managed by

the proprietor or an officer—in fact, it will probably show greater increase when placed in a trust fund with one of the organizations specializing in that type of service."

Up until a few years ago, bank trust accounts were unavailable to the small investor. But now, "periodic deposits may be made into individual trust accounts," points out Mr. Gore. "These funds are invested according to the method prescribed in a standardized form of trust agreement and secure for trust founders a beneficial interest in an appropriately supervised portfolio comprising a group of the leading profit-making corporations of the country. Income is collected and reinvested—compounded . . . by the trustee. In this way trust funds are built up over a period of time, protected and kept intact for their founders. The complication—heavy expense—presented by the multiplicity of details of administration has been overcome by standardization of practice. It has become a thoroughly practical plan for the funding of business reserves."

Champion Paper & Fibre Votes New Issue

[FROM OUR REGULAR CORRESPONDENT]

DAYTON, Ohio, February 10, 1936—At a special meeting of stockholders of the Champion Paper and Fibre Company at Hamilton on February 6, approval was given for authorization of 75,000 additional no-par common shares and 25,000 shares of 6 per cent cumulative preferred stock of that concern.

This action was taken as a move toward financing a wood pulp mill to be erected near Houston, Texas, at an estimated cost of $3,000,000 to $3,500,000.

A syndicate headed by W. E. Hutton & Co., Cincinnati, and Goldman Sachs & Co., New York, will make a public offering of 17,500 shares of newly-authorized preferred stock and 100,000 shares of common stock, in the near future.

The common stock offering includes the 75,000 shares authorized at the Hamilton meeting; 3,381 shares held in the treasury, and 21,619 shares purchased from members of the Thomson family and other large holders.

Registration statement for the new stock was filed with the Securities and Exchange Commission several weeks ago, it was said.

Stockholders approved an increase in the number of directors from seven to nine. These additional directors, who will be elected at the annual meeting, will represent the underwriters, it is understood.

It was stated that stockholders waived their pre-emptive rights to the new common stock and voted to eliminate 16,474 shares of 7 per cent special preferred stock which was previously authorized but never issued.

Eddy Reports Record Profit

CHICAGO, Ill., February 10, 1936—The Eddy Paper Corporation, on February 5, reported a record profit earned in 1935, and announced the declaration of a dividend of 40 cents a share on the capital stock, payable February 29. On November 30 of last year a like distribution was made, and a dividend of 30 cents a share was paid on August 31, 1933. Net income for the year ended December 31, 1935, was $566,826, equal to $3.18 per share on the outstanding stock. This exceeded the previous reported peak net of $360,648 or $2.02 a share earned in 1934. The company operates an important plant at Rockford, Ill.

Production Ratio Report

These statistics are based upon paper production reports to the American Paper and Pulp Association.

COMPARATIVE MONTHLY SUMMARIES

1935	Total Production Ratio	1934	Total Production Ratio
January	65.8%	January	.....
February	70.0%	February	.....
March	70.5%	March	.....
April	70.0%	April	.....
May	69.4%	May	.....
June	72.3%	June	.....
July (b)	67.8%	July	.....
August	70.9%	August	.....
September (c)	75.0%	September (c)	59.4%
October	75.6%	October	64.7%
November	75.3%	November	61.7%
December (a)	74.3%	December (a)	62.1%
YEAR, 1935	71.2%		

COMPARATIVE WEEKLY SUMMARIES

CURRENT WEEKS, 1936		CORRESPONDING WEEKS, 1935	
*January 4	72.6%	January 5	60.2%
*January 11	75.9%	January 12	65.1%
*January 18	77.2%	January 19	67.0%
*January 25	76.9%	January 26	68.6%
*February 1	74.9%	February 2	68.1%

The following statistics show the number of mills reporting by ratio groups:

Ratio Limits	Number of Mills Reporting, Current Weeks: Jan. 4, 1936	Jan. 11, 1936	Jan. 18, 1936	Jan. 25, 1936	Feb. 1, 1936
0% to 50%	142	86	84	91	66
51% o 100%	198	252	254	237	160
Total Mills Reporting	340	338	338	328	226

* Subject to revision until all reports are received. These data exclude (a)—Christmas Day, (b)—Fourth of July, (c)—Labor Day.

PAPERBOARD OPERATING RATIOS

According to reports from the National Paperboard Association, per cents of operation, based on "Inch-Hours," were as follows:

1934		1935		1935		1935	
September	62%	January	61%	May	61%	September	69%
October	63%	February	67%	June	65%	October	76%
November	56%	March	67%	July	59%	November	70%
Dec. (a)	53%	April	61%	August	65%	December	60%
Week ending Jan. 4, 1936	51%			Week ending Jan. 18, 1936	61%		
Week ending Jan. 11, 1936	65%			Week ending Jan. 25, 1936	64%		
		Week ending Feb. 1, 1936	63%				

H. J. Toepfert to Manage American Tissue

[FROM OUR REGULAR CORRESPONDENT]

HOLYOKE, Mass., February 10, 1936—Former Mayor Henry J. Toepfert was last week elected general manager of the American Tissue Mills, Inc., at a meeting of the stockholders and took up his new duties this week. At the same time the payment of $46,000 in accrued preferred stock dividends was made amounting to $12.50 per share on 3,753 shares of stock.

The by-laws provide that when the amount of unpaid dividends on preferred stock amount to $10.50 a share the preferred stockholders may vote; as the payment was made the preferred stockholders were precluded from voting.

In a letter to the stockholders, Benjamin F. Perkins stated his belief that the preferred stockholders would endeavor to get control of the company.

Benjamin F. Perkins was elected president, J. Lewis Perkins, treasurer, and Mrs. Malvena Perkins, vice-president and chairman of the board of directors.

Inland Empire Paper Co. Gets Loan

Washington, D. C., February 12, 1936—The Reconstruction Finance Corporation has announced that in December it authorized a loan of $500,000 to the Inland Empire Paper Company, of Millwood, Wash.

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Section of the
Technical Association of the Pulp and Paper Industry
Edited by Ronald G. Macdonald, Secretary

Analysis of Sulphite Waste Liquor*

By A. M. Partansky[1] and H. K. Benson[1]

Sulphite waste liquor (s.w.l.) contains a large number of chemical compounds. In addition to free SO_2, lime, calcium ligno-sulphonates (referred to usually simply as "lignin"), and sugars, there are also present acetic and formic acids, furfural, volatile aldehydes, methyl alcohol, mannonic and xylonic acids *(20)*, d-gluconic and other acids derived from aldose sugars *(19)*, and vanilin-like and terpene-like substances *(50)*. In the condensed steam and waste gases released from a digester methyl alcohol, furfural, small amounts of acetone, acetaldehyde, acetic and formic acids, and an oil which consisted in part of cymene and borneol were found by Bergström (*7*).

The analyses of s.w.l. which heretofore have appeared in the literature, contain no complete or detailed scheme of procedure. In our work on fermentation of s.w.l. by anaerobic bacteria, reported elsewhere, such a scheme was essential in order to follow quantitatively the changes produced. A search of the literature on the subject showed that although analytical methods as such are available for the determination of the substances present in the s.w.l. yet their separate determination in the liquor in most cases required modification of the existing procedures. This paper gives a survey of the methods found in the literature, the opinions of other writers upon these methods, and our own experiences. From these we evolved a concise systematic method of analysis for sulphite waste liquor.

I. Total Solids.

The solids obtained on evaporation of s.w.l. when subjected to drying at 105. deg. C. continue to lose weight quite rapidly after the first three hours of drying (the usual time for drying organic material), and do not reach even the approximately "constant value" until after a 24-hour drying period. After this time the loss in weight, we believe, is due not so much to the loss of moisture, but to the volatilization of small quantities of some volatile organic substances present in the s.w.l.

We found on different occasions that duplicates dried for 24 hours often agree within O.1 per cent, while when dried for 3 hours they may vary by as much as 1 to 2 per cent. Therefore, to have comparative and reproducible results the longer drying periods are preferable. Table I shows results of the drying experiment. Two 5-cc. samples of s.w.l. in tared crucibles were evaporated down on a water bath and then placed in a 105 deg. C. oven for drying. Weighings were made after stated periods as indicated in Table I.

TABLE I—LOSS IN WEIGHT ON DRYING SULPHITE WASTE LIQUOR SOLIDS

Time of drying, hours	Weight of solids, mg./5 cc. average of two samples	Total loss in weight, mg.	Average loss per hour, mg.
3	761.7	...	...
6	710.4	51.3	17.1
21	644.7	117.0	4.4
28	644.2	117.5	0.1
48	643.5	118.5	...
72	642.7	119.0	...
96	640.7	121.0	...
120	639.1	122.6	...
145	638.9	122.8	...

RECOMMENDED PROCEDURE I: TOTAL SOLIDS.
Accurately pipet two 5-cc. samples of s.w.l. into tared 10-cc. porcelain crucibles and place in a 105 deg. C. oven for 24 hours. Cool in a desiccator and weigh in a stoppered weighing bottle as it is somewhat hydroscopic. Report as grams per liter or per cent by weight. Save for determinations II and III.

II. Residue on Ignition.

S.w.l. solids contain organic matter, sulphur in various forms and calcium (also some magnesium and sodium). When the solids are ignited and the residue is moistened with acid, e.g. hydrochloric, it effervesces and the odor of hydrogen sulphide is given off; this indicates the presence of carbonates and sulphides. Sulphates and oxides are also present in the residue. The relative proportions in which these anions will be found depends on the exact conditions of ignition, such as temperature, access of oxygen, and so forth. For these reasons, one would expect "residue on ignition" of s.w.l. to be a variable quantity, this was confirmed by experiment.

TABLE II—RESIDUE ON IGNITION OF SULPHITE WASTE LIQUOR SOLIDS

(In milligrams per 5 cc. samples)

Sample No.	Residue on ignition I	Carbonates and oxides as $CaCO_3$ II	Sulphates as $CaSO_4$ III	Sulphides as CaS IV	Residue on ignition as sulphates V
1	63.4	....	....	....	92.6
2	60.4	37.4	34.3	....	....
3	65.6	35.9	35.3	....	....
4	61.5	....	....	1.5	....
5	66.7	....	....	....	93.1
6	66.0	....	....	....	92.9

In the experiments summarized in Table II six 5-cc. samples of the same liquor were evaporated to dryness in small tared crucibles and thoroughly ignited with a Meeker burner for 30 minutes, column I. Samples No. 2 and No. 3 were titrated with 0.1 N/HC_1 to methyl orange end point; the titration value gave the acid equivalent of car-

* Contribution from the Department of Chemistry, University of Washington, Seattle, Washington.

[1] University of Washington, Seattle, Wash.

bonates and oxides combined. Results given in column II were computed as calcium carbonate; if they were computed as calcium oxide, the values would have been 21.0 and 20.1 milligrams respectively. Sulphates present were then determined on the same samples; results expressed as mg. of calcium sulphate are given in column III. Sample No. 4 was taken up with water, acidified and titrated with iodine; results are given as mgrs. of calcium sulphide in column IV. The remaining three samples were converted into sulphates by moistening with sulphuric acid, evaporating and igniting again,—column V. Note the remarkably good agreement between all three.

Because of the irregularity and variation in the composition of the residues on ignition, we recommend their conversion into sulphates, as this method gives reproducible results and a constant basis for comparison.

RECOMMENDED PROCEDURE II: RESIDUE ON IGNITION.

Ignite thoroughly the s.w.l. solids obtained in Procedure I with a good Meeker burner (about 15 to 30 minutes); cool; moisten with a little water, add carefully 0.3 to 0.4 cc. concentrated sulphuric acid (an excess), and evaporate to dryness on a hot plate under a hood. After the white fumes of SO_3 cease, ignite on a Meeker burner for five minutes; cool in a desiccator, and weigh as "residue on ignition." Report as percentage of total solids.

III. Calcium.

Most of the calcium present in s.w.l. is in the form of calcium ligno-sulphonate, though some free calcium bisulphite is usually also present. For determination of calcium in s.w.l. the organic matter must be first destroyed.

Miller and Swanson (36) digest the s.w.l. samples with nitric and sulphuric acids until all organic matter is oxidized. We much prefer to use for this determination ignited solids obtained in Procedure I. With fairly new crucibles, glaze intact, there are no losses, and the method is much more convenient.

RECOMMENDED PROCEDURE III: CALCIUM.

Ignited solids from 5 cc. samples of s.w.l obtained in Procedure I are treated with 2 cc. of 6 N HCl, and after effervescence ceases transferred quantitatively into a 400-cc. beaker using hot water. The volume of the solution is made up to 200 cc., it is neutralized with ammonium hydroxide and the calcium precipitated with ammonium oxalate. After decanting through a Gooch or Calwell crucible, dissolving and reprecipitating, the oxalate is filtered off and determined by titration with 0.1 N $KMnO_4$. Report both as grams of CaO per liter and as per cent of total solids.

Calculations: 1 cc. of 0.1 N $KMnO_4$ = 0.00280 grams CaO.

IV. Sulphur.

Considerable work has been done on the analysis of sulphite cooking acid for free and combined sulphurous acid, and several reliable methods are available.

In the well-known Winkler and Höhn's method, on the assumption that sulphurous acid is the only acid present, free SO_2 is determined by titration with 0.1 N NaOH and phenolphthalein indicator. Total SO_2 is determined by the iodine titration in the usual way, and the difference between the two values is taken as the "combined SO_2" and CaO content. Sieber *(45)* recommends in NaOH titration to use methyl-orange or paranitrophenol indicator instead.

Streeb's *(48)* double titration method for determining free and combined SO_2 is based upon the fact that bisulphite behaves toward phenolphthalein as an acid, but towards methyl orange as a neutral compound.

Sander's method *(41)* is founded on the fact that bisulphites with an excess of $HgCl_2$ form complex compounds with the liberation of HCl, for example:

$$Ca(HSO_3)_2 + HgCl_2 = Ca(HgClSO_3)_2 + 2\ HCl$$

A sample of cooking acid is titrated with 0.1 N/NaOH and methyl orange until the color change; this gives the free SO_2. Then excess of $HgCl_2$ is added and the HCl liberated determined by continuing the titration; this gives the total bisulphites.

In dealing with s.w.l. the terms "free" and "combined" SO_2 lose the simplicity they had in the analysis of raw liquor; for the actually "free" SO_2 is in equilibrium with SO_2 loosely combined with organic matter, while the "combined" SO_2 is combined not only with calcium but also with organic substances in various degrees of stability. The analysis is also complicated by the presence of organic acids (formic and acetic) formed from wood during the cooking process, and the presence of active reducing substances of organic nature, such as sugars. All this makes most of the before-mentioned methods inapplicable.

The presence in s.w.l. of organic acids makes Winkler and Höhn's method for determination of free SO_2 by direct titration with alkali of very doubtful value (13), (15), *(36)*. The ligno-sulphonic acids also interfere due to their buffering action, and because of the color developed by them as neutrality is approached.

Iodometric determination of free SO_2 by first distilling it from a s.w.l. sample with a strong mineral acid *(13)*, such as HCl *(43)* or with acetic acid *(49)* has only a comparative value *(13)* for not only the true free SO_2 but also that combined with organic matter distills over, the exact amount depending on the length of time and other conditions of distillation.

The sulphur dioxide combined in a form of bisulphite to the carbonyl group of sugars is called by Hägglund *(21)* a "loosely combined SO_2"; these bisulfite sugar compounds dissociate readily *(37)*. However, because they are not salted out by NaCl, Öman *(39)* believes these compounds to be esters of sulphurous acid rather than true aldehydic or ketonic compounds with SO_2.

An excellent method of SO_2 analysis in s.w.l. is that of Barsky *(2)*, who distinguishes three forms of SO_2 namely: "free SO_2" and "loosely combined SO_2 of first and second kind." In his definition "free SO_2 is the sum of free sulphurous acid, bisulphites and sulphites. Barsky states that the amount of free SO_2 as determined by the iodine method in the ordinary way increases directly with dilution and temperature rise, showing that there exists an unstable form of combination of SO_2 in equilibrium with free SO_2; however, by using ice cold titrations, continuous dissociation of the organic complexes is prevented, and a permanent end point is obtained. In our experience at 0 deg. C. the blue color of the iodine-starch complex produced by one drop excess of 0.1 N iodine persists under these conditions for at least four minutes. The "loosely combined SO_2 of the first kind" is defined by Barsky as that SO_2 which is readily removed from the organic molecules by treating with alkali at room temperature; while to split off completely the "second kind of loosely combined SO_2" four hour heating with alkali is required. We found that when s.w.l. is treated at room temperature with an equal volume of 10 per cent NaOH the iodine titration value increases gradually until 30 minutes have elapsed, after which time there is no further increase, even in a sample heated for two hours on a water bath.

For this reason we recognize only one kind of "loosely combined SO_2."

For deterimnation of sulphates in s.w.l., Sutermeister recommends Sander's *(42)* method which consists in first precipitating most of the lignin and expelling the SO_2 by boiling for one hour 20 cc. of s.w.l. with 20 cc. of concentrated HCl in a flask in atmosphere of CO_2 and then extracting the sulphates with hot water and determining them by precipitation with $BaCl_2$. This is similar to the method used by Scherrard and Blanco *(43)*. Our results obtained with samples boiled in narrow neck flasks in CO_2 atmosphere checked with those obtained without the car-

bon dioxide, which use we consider as an unnecessary refinement.

The sulphone sulphur or permanently combined sulphur of Barsky is the sulphur bound to lignin. It is best determined by difference: total sulphur minus all other varieties already mentioned.

RECOMMENDED PROCEDURE IV: SULPHUR

(a). Total sulphur is determined by the alkaline permanganate method of Pollock and Partansky *(40)*. Place from 1.5 to 2.0 cc. of digester strength s.w.l. diluted to 5 cc. with water in a 25-cc. porcelain crucible, add 1 cc. of concentrated NaOH solution and 5 to 7 cc. of saturated $KMnO_4$ solution; mix well; evaporate to dryness; ignite very thoroughly; cool; add concentrated HCl (about 5 cc. is required) and evaporate to dryness to reduce all MnO_2 and the excess of $KMnO_4$; take up the colorless residue with hot water and filter into 600-cc. beakers, washing thoroughly; dilute the filtrate to 400 cc.; adjust the acidity and precipitate the sulphates with $BaCl_2$ in the usual way. Report as **grams of sulphur per liter.**

Calculations: 1 gram of $BaSO_4$ = 0.13736 grams of sulphur.

(b). Sulphates are determined by Sander's method *(42)*. Pipet 25 cc. of s.w.l. into a narrow neck Erlenmeyer flask; add 25 cc. of 12 N HCl and 25 cc. of water, and boil gently for one hour on a salt water bath. The salt water bath avoids the "bumping" that occurs when a hot plate is used. Extract the precipitated lignin several times with hot water, decanting through filter into a beaker; precipitate as usual with barium chloride. Report as grams of SO_3 per liter.

Calculations: 1 gram of $BaSO_4$ = 0.3430 grams of SO_3.

(c). Free SO_3 is determined by Barsky's method *(2)*. In a 250-cc. Erlenmeyer flask place about 50 grams of crushed ice and 25 cc. of water; into this pipet 5 cc. of s.w.l.; titrate from a micro burette with 0.1 N iodine solution. Report as **grams of SO_3 per liter.**

Calculations: 1 cc. 0.1 N I_2 = 0.0032 grams SO_3.

(d). Loosely combined SO_3 is determined by a modification of Barsky's method. Place 5 cc. of s.w.l. in a 250 cc. Erlenmeyer flask, add 5 cc. of 10 per cent NaOH and allow to stand at room temperature for one hour; add 60 grams of crushed ice and neutralize with sulphuric acid (determine beforehand the exact amount required), and titrate with iodine. This gives the free and the loosely combined SO_3 together; subtracting the value of free SO_3 obtained in (c) we get the loosely combined SO_3.

(e). Permanently combined SO_3 or sulphone sulphur is determined by difference. From the total sulphur subtract sulphate, free and loosely combined SO_3 (all expressed as mols per liter) to obtain mols of sulphone sulphur per liter. Report as grams of SO_3 per liter, obtained by multiplying "mols" by the factor, 64.

V. Organic Matter or Permanganate Oxygen Consumed.

Genberg *(15)* calls "organic matter" that part of s.w.l. solids which on evaporating the s.w.l. to dryness with an equal volume of concentrated HCl becomes insoluble in hot water. This precipitate consists only of a part of the lignin present, and, therefore, the determination has no definite value. Our "volatile matter" determination (Procedure II) gives a much closer approximation to the true "organic matter."

For comparative results on the readily oxidizable organic matter present in s.w.l. the simple, rapid and very reliable "Permanganate Oxygen Consumed" test of Benson and Hicks *(3)* is highly recommended. The organic substances present in s.w.l. under the conditions of this determination are at least 90 per cent oxidized to carbon dioxide and water *(3)*.

RECOMMENDED PROCEDURE V: PERMANGANATE OXYGEN CONSUMED

Run in triplicates.

In a 250-cc. Erlenmeyer flask place 10 cc. of standard 0.1 N $KMnO_4$ solution (3.16 grams $KMnO_4$ per liter), one cc. of saturated NaOH solution, a sample of digester liquor that will consume between 3.0 to 4.5 cc. of the permanganate solution (for undiluted, digester strength s.w.l. dilute 5 cc. to a liter and use 5 cc. of this solution), and enough boiling-hot distilled water (measured roughly with a graduate) to make the total volume 110 cc. The flask is then placed for 30 minutes in lively boiling water in a one liter beaker, the water being maintained at a vigorous boil throughout the period. After digestion the sample is acidified with 25 cc. of the Zimmerman-Reinhardt solution (contains 67 grams $MnSO_4.4H_2O$, 138 cc. 85 per cent phosphoric acid, and 130 cc. 98 per cent sulphuric acid per liter). Immediately thereafter 10 cc. of 0.1 N ferrous sulphate solution is added (solution contains 39.2 grams $FeSO_4.(NH_4)_2SO_4.6H_2O$ per liter in 0.3 N H_2SO_4). The sample is cooled to room temperature and the excess of ferrous ion titrated with the standard 0.1 N permanganate solution. The difference between this value and a blank is cc. 0.1 N $KMnO_4$ consumed. Report as mg. of oxygen consumed per cc. of s.w.l.

Calculations: 1 cc. 0.1 N $KMnO_4$ = 0.8 mg. oxygen.

VI. Volatile Acids.

S.w.l. always contains acetic and formic acids, but no other volatile acids *(25)*. These acids are obtained also from wood in the process of dry distillation or can be extracted by boiling wood-chips with water under pressure, in which case Bergström obtained 1:53 per cent acetic acid and 0.23 per cent of formic acid on a dry wood basis.

In s.w.l. Hönig *(25)* reports from 2.15 to 9.09 grams of volatile acids per liter, the ratio of formic to acetic varying from 1:5.6 to 1:13.6. Heiduschka and Munds *(23)* give s.w.l. content of acetic acid as 0.16 to 0.81 per cent and formic acid as 0.009 to 0.18 per cent. Cross *(11)* gives volatile acids in wood as 1.2 to 2.8 per cent on the dry wood basis, setting the ratio of formic to acetic acids at one to four. In our experience, in the liquors analyzed this ratio varied between 1:3.36 to 1:5.70, and the total acids were between 4.93 to 6.41 grams per liter.

These acids are formed during the cooking process by hydrolysis of lignin which contains formyl and acetyl groups *(11)*. The degree of hydrolysis achived depends on the specific conditions and time of cooking, which explains the wide fluctuation in values obtained *(11)*, *(25)*. Theoretically, in the case of a complete hydrolysis of the acetyl group of lignin 2.86 per cent acetic acid on a dry wood basis could be produced according to Klason *(29)*.

Hönig's procedure *(25)* for the determination of volatile acids in s.w.l., was to destroy SO_2 in the distillate with hydrogen peroxide and to remove the excess of the peroxide with mercurous oxide. We have found, however, in this laboratory that both hydrogen peroxide and HgO (formed from Hg_2O by the peroxide) attack formic acid even in the cold. Formic acid was determined by Hönig gravimetrically with mercuric chloride, the volatile aldehydes which also have reducing properties being first removed. Our procedure as here outlined is considerably shorter and eliminates some sources of error of the Hönig's procedure.

The volatile acids are first distilled from s.w.l. acidified with phosphoric acid. The absence of acids other than formic and acetic in the s.w.l. distillate was verified using Dyer's *(14)* ferric chloride amyl alcohol test. It was found by experiments with pure substances, that in the recommended procedure 93.7 per cent of formic and 98.3 per cent of acetic acid distil over, and that lignin is not hydrolysed. The complete determination requires three titrations of aliquot portions of the distillate. Titration with NaOH, with phenolphthalein indicator, gives the total acidity which includes both organic acids and SO_2. Titration with iodine gives SO_2, and the difference between these two titrations gives organic acids. Titration of a sample refluxed with mercuric oxide, which destroys formic acid and neutralizes sulfurous acid, gives acetic acid alone. Formic acid equivalent is then the difference between the "total organic acids" and the acetic acid values.

RECOMMENDED PROCEDURE VI: VOLATILE ACIDS

Place an accurately measured 50 cc. sample of s.w.l., 15 cc. of 85 per cent orthophosphoric acid, and 25 cc. of water in a 300-cc. distilling flask provided with a dropping funnel and attached to a condenser; distil at a moderate rate, collecting distillate into a graduate. As soon as 25 cc. of distillate is collected transfer it into a 250-cc. volumetric flask, and through the dropping funnel add 25 cc. of water to the distilling mixture; continue distillation, repeating the cycle, until exactly 250 cc. of distillate is collected. Mix the distillate thoroughly; titrate a 25 cc. sample with 0.1 N NaOH to phenol phthalein end point; titrate another 25 cc. sample with 0.02 N iodine. The 0.1 N NaOH equivalent of total organic acids in 25 cc. of the distillate will be the iodine titration multiplied by five, subtracted from the NaOH titration. This value may be represented by A. Next place a 25-cc. sample of the distillate into a 250-cc. round bottom flask, add 0.3 to 0.4 grams of mercuric oxide (an excess), connect with a reflux condenser and boil gently for ten minutes. Cool the flask, rinse the condenser with distilled water, detach, and titrate the solution with 0.1 N NaOH. This value which may be represented by B, is the acetic acid equivalent. The value B subtracted from the value A above is the formic acid equivalent. Save the rest of the distillate for Procedure VII. Report the acids as grams per liter.

Calculations: 25 cc. samples of the distillate are equivalent to 5 cc. of the original s.w.l.

Acetic acid: 1 cc. 0.1 N NaOH, B = 0.0060 grams acetic acid.

Formic acid: 1 cc. 0.1 N NaOH, A-B = 0.0046 grams formic acid.

Note: The formic acid value should be multiplied by the factor 1.067 to correct for the incomplete recovery of this acid from s.w.l. in the distillation procedure.

Total Organic Acids is the sum of formic and acetic acids.

VII. Minor Volatile Constituents: Methanol, Ethanol and Acetone.

The acid distillate obtained in Procedure VI has certain reducing properties, equivalent to about 1.0 to 1.5 per cent

of that of the original s.w.l. It also gives a considerable haloform reaction with alkaline iodine solution, showing that methyl ketone bodies such as acetone, aceto-acetic acid and the like are also present. These various substances were not specifically identified by us, and only the methanol, ethanol and acetone were determined.

Methyl alcohol content of s.w.l. was reported by Anon *(1)* as 7.0 kg. per ton of pulp produced, while Bergstrom *(4)* stated that 8 to 10 kg. are being carried away by the steam released from a digester per ton of pulp. We found 0.72 to 1.26 grams of methanol per liter of waste liquor, which corresponds to 5.5 to 9.6 per ton of pulp. Quantitative data regarding ethanol and acetone in s.w.l. could not be found in the literature. We found 0.157 to 0.230 grams of ethanol and 0.10 to 0.15 grams of acetone per liter s.w.l., which corresponds to 1.2 to 1.7 kg. and 0.7 to 1.1 kg. per ton of pulp, respectively.

Preparation of Sample. 125 cc. of the distillate from Procedure VI are neutralized by alkali, with methyl orange as the indicator, excess of alkali added, and distilled, collecting 100 cc. of the distillate in a volumetric flask. One cc. of this distillate is equivalent to 0.25 cc. of the original liquor. The following determinations are then made on this distillate.

RECOMMENDED PROCEDURE VII A: METHANOL.

For the determination of methanol Simmond's adaptation of Denige's colorimetric method *(46)* was used. To 5 cc. of the distillate, containing between 0.3 to 1.0 mg. of methanol (dilute if necessary), placed in a wide test tube, add 0.6 cc. of 95 per cent methanol free ethyl alcohol (to make 10 per cent alcoholic solution), 2.5 cc. 2 per cent solution of $KMnO_4$ and 0.2 cc. of concentrated sulphuric acid. After three minutes add 1.0 cc. 5 per cent oxalic acid solution and 1.0 cc. of concentrated sulphuric acid, and mix. When colorless add 5 cc. of Schiff's reagent (1.0 grams fuchsin, 10 grams Na_2SO_3, 17 cc. 6 N HCl per liter). Violet color begins to form in a few minutes. After one hour compare with the series of standard solutions of methanol treated in the same way as the sample. Report as grams per liter.

RECOMMENDED PROCEDURE VII B: ETHANOL.

Place 50 cc. of the distillate in a 250-cc. round bottom flask, containing 5 grams of potassium dichromate and 25 cc. of 85 per cent phosphoric acid. Connect at once with an efficient reflux condenser and boil gently for six minutes. During heating rinse the condenser tube with distilled water at intervals. Cool the flask; rinse condenser again and distil the acetic acid formed, collecting the distillate into a flask. Titrate with 0.1 N NaOH using phenolphthalein as an indicated. Report as grams of ethanol per liter.

Calculations: 1 cc. 0.1 N NaOH = 4.605 mg. Ethanol.

RECOMMENDED PROCEDURE VII C: ACETONE AND RELATED COMPOUNDS.

For the determination of acetone Goodwin's revision of Messinger's method *(17)* was used. To 25 cc. of the distillate placed in a 250-cc. Erlenmeyer flask add 25 cc. of 2.0 N NaOH, then add 10 cc. of 0.1 N iodine solution with continuous shaking. Let stand for 15 minutes at room temperature, neutralize with 2 N N_2SO_4, adding 0.3 to 0.5 cc. in excess to that required to neutralize the alkali. The excess of iodine is titrated with 0.05 N sodium thiosulphate solution. Blank runs on the reagents used are made simultaneously and the difference between these two values represents the amount used in the haloform reaction. Report as grams of acetone per liter.

Calculations: 1 cc. of 0.1 N I_2 = 0.967 mg. Acetone.

VIII. Furfural.

According to Bergström's patent *(8)* furfural can be produced by heating wood with sulphurous acid solution under pressure, the highest yield being obtained at 155 deg. C. During the sulphite pulping process similar conditions prevail; therefore as one would expect furfural is always present in s.w.l. Krause *(33)* reports 0.01 to 0.02 per cent furfural in s.w.l., and in our studies we found the percentage of furfural in the liquors to vary within a rather narrow limit,—0.023 to 0.029 per cent.

RECOMMENDED PROCEDURE VIII: FURFURAL.

Place 75 cc. of sulphite waste liquor and a little parafin in a 300-cc. distilling flask, provided with a dropping funnel and attached to a condenser and distil, collecting the distillate which is made to pass first through a filter, into a graduate. As soon as 30 cc. of the distillate is collected, add 30 cc. of water to the distillation flask and continue the distillation in this manner with periodic additions of water until 260 cc. of the distillate is collected. To the distillate add 100 cc. of HCl (sp. gr. 1.185) to make the total volume 360 cc. and 12 per cent in HCl, then add 40 cc. of filtered phloroglucine solution (11 grams of phloroglucine in 1500 cc. of 12 per cent HCl); after standing for 16 hours, filter the precipitated furfural-phloroglucide through a tared Gooch crucible, wash with exactly 150 cc. of cold water, dry for 2½ hours at 105 deg. C., and weigh. Report as grams of furfural per liter.

Calculations, using Kröber's *(67)* factors:
(Wt. of furfural-phloroglucide in grams + 0.0052) × (0.518) = grams of furfural.

IX. Pentosans and Pentoses.

Krause *(33)* reports s.w.l. to contain from 0.41 to 0.47 per cent of pentosans and pentoses; Lottermoser *(35)* gives 0.30 per cent pentoses; while Hägglund's *(22)* figure is 0.31 per cent. We found in the several waste liquors analysed between 0.26 and 0.34 per cent pentoses and pentosans.

In determination of pentosans in sulphite waste liquor the usual method of distillation of the material with 12 per cent HCl followed by precipitation of furfural with phloroglucinol can be used. The method is described in full by Bray *(10)*. Addition of parafin into the distilling flask as recommended in Bray's procedure is of especial importance with s.w.l. for it keeps back the colloidal sulphur which otherwise appears in the distillate, making it cloudy. We found that all pentosans are converted into furfural going over in the first 360 cc. of the distillate; as the subsequent distillate gives a negative furfural test.

RECOMMENDED PROCEDURE IX: PENTOSANS AND PENTOSES.

Place 50 cc. of s.w.l. in a 300-cc. distilling flask, provided with a dropping funnel (ground glass connection), and attached to a condenser. Place about one gram of parafin in the flask, and add 19 cc. of concentrated HCl (sp. gr. 1.185), and 31 cc. of 12 per cent HCl, making the total volume of solution 100 cc. and 12 per cent in HCl. Distil at a moderate rate, collecting the distillate which is made to pass first through a filter into a graduate. As soon as 30 cc. of the distillate is collected, add 30 cc. of 12 per cent HCl to the distillation flask and continue the distillation in this manner with addition of acid at intervals until 360 cc. of distillate is collected. To the total distillate add 40 cc. of phloroglucine solution and continue as in Procedure VIII.

Calculations: (wt. of ppt. in grams + 0.052) × (0.518) = grams of furfural obtainable from 50 cc. of liquor. Multiply by 20 to convert this value to per liter basis; then subtract the free furfural found in Procedure VIII, to get furfural from pentoses, which on multiplication by 1.942 is converted into grams of pentoses per liter.

X. Lignin.

During the sulphite cooking process, with the exception of a small amount of lignin that is retained by the pulp, the lignin of the wood chips goes into solution as ligno-sulphonic salts of calcium.

Accurate quantitative methods, based on extracting and dissolving out everything except lignin, are available for determination of lignin in wood or in pulp. However, lignin determination in s.w.l. where it is present in a soluble form, is considerably more difficult and less accurate, for no known reagent gives a complete precipitation.

Ligno-sulphonates can be precipitated from s.w.l. with 80 per cent ethyl or methyl alcohols, with 20 per cent sulphuric acid, salted out with NaCl or $CaCl_2$; they are also precipitated by calcium oxide, by lead acetate, and by beta naphthylamine. The various methods of precipitation were tried out by us to test their adaptability for quantitative lignin determination and lignin was prepared by these various methods for methoxyl determination. Our experiences may be briefly summarized as follows:

1. Precipitation with ethyl alcohol does not begin to take place until after concentration of the alcohol has exceeded 65 per cent by volume and is practically complete when it reaches 80 per cent. The precipitate is pastelike in consistency and very sticky. It can not be directly transferred quantitatively. The lignin is recovered by decanting the solution, washing precipitate in the beaker with 80 per cent alcohol, dissolving it with water, transferring the solution into an evaporating dish, and evaporating it to dryness. Precipitation of lignin is only about 50 per cent complete. Methanol gives results similar to that of ethanol.

2. When sulphuric acid is gradually added, with cooling, to s.w.l. until 20 per cent H_2SO_4 concentration is attained a light-brown, flocculent, easily filterable precipitate of ligno-sulphonic acids separates out. The precipitate is very soluble in water and is, therefore, after filtering

through Gooch, washed with a small amount of 20 per cent sulphuric acid. It is determined by dissolving with water, neutralizing with calcium carbonate, filtering off the precipitated $CaSO_4$, evaporating the combined filterate and washings to dryness, and weighing the solids. Precipitation of lignin is only about 60 per cent complete.

3. The salting out procedures can not be used for quantitative measurements.

4. Precipitation of lignin with calcium hydroxide is now a commercial process *(26)*. In our experience, at least three treatments using two to three grams of pulverized $Ca(OH)_2$ per 100 cc. of s.w.l. are required to obtain a fairly complete removal of lignin. About 60 per cent of lignin is precipitated in the first treatment at 100 deg. C., the exact quantity being a function of many factors.

5. Lead acetate as a lignin precipitating reagent has been used by Humm *(27)*; it is also the precipitant for Klason's beta lignin *(31)*. We found, however, that the lead ligno-sulphonate is too soluble to be determined quantitatively.

6. Beta naphthylamine hydrochloride is the best reagent for precipitation of ligno-sulphonates. Klason *(29)* states that it precipitates only the so-called alpha lignin, which according to him constitutes 63 per cent of the total lignin. Hägglund and co-workers *(22)*, however, report that 90.5 per cent of the lignin present in solution can be precipitated by this reagent. Our findings agree with Hägglund that about 90 per cent of the lignin, as measured by methoxyl content, is precipitated with beta naphthylamine in two precipitations.

Taking Klason's formula for beta naphthylamine alpha ligno-sulphonate as $(C_{10}H_{10}O_3)_3(H_2SO_3)(C_{10}H_7N)(H_2O)$, mol. wt. 777, the weight of the precipitate is multiplied by 0.793 (616/777) to obtain the weight of ligno-sulphonic acid or by 0.687 (534/777) to obtain the weight of lignin part alone. The following procedure based upon the general outline given by Hägglund *(22)* has been worked out by us for quantitative determination of lignin in s.w.l.

RECOMMENDED PROCEDURE Xa: LIGNIN AS BETA NAPHTHYLAMINE LIGNO-SULFONATE.

Accurately pipet 10 cc. of s.w.l. into a small beaker, heat on a hot plate for 10 to 15 minutes to expell free SO_3, make up the water lost, cool and add with stirring 10 cc. of filtered 3 per cent solution of beta naphthylamine hydrochloride in 0.3 N HCl, cover with a watch glass and place on a water bath for an hour to digest. As the solution warms up the fine, lemon-yellow precipitate that has separated at first begins to coalesce, becoming orange-colored, then brown in color, and is soft, gum-like in consistency; on cooling it becomes hard and brittle. Decant the solution through a tarred Gooch crucible (with a thin asbestos mat), then transfer the precipitate with 30 to 40 cc. of water using a rubber "policeman." Save the filtrate and washings for sugar determination, Procedure XI. The precipitate is first completely air-dried (12-24 hours) and then oven-dried at 105 deg. C for three hours. Weigh as naphthylamine ligno-sulphonate. Report as grams of lignin per liter.

Calculations: (Wt. of ppt.) × (0.687) × (1.22) = weight of lignin in 10 cc.

Note: The factor 1.22 is used to correct for the lignin (18 per cent) that is not precipitated in the procedure, explanations follow.

Xa. Lignin from Methoxyl Determination.

Methoxyl groups are characteristic of lignin, so that if the methoxyl content of a sample of s.w.l. is determined and the percentage of methoxyl in s.w.l. lignin is known, the amount of lignin in the s.w.l. sample can be easily calculated.

Klason *(29)* gives methoxyl content of lignin prepared by acid hydrolysis as 14.3 per cent and quotes Hägglund's value as 14.4 per cent; however, presence of methyl alcohol in s.w.l. indicates that some of the methoxyl of the lignin was split off during the cooking and that, therefore, lignin of s.w.l. should have a smaller methoxyl content than the above value. Experiments proved that that was the case. Lignin was isolated from s.w.l. by four methods described in the previous section and purified in each case by double reprecipitation (using the same reagents as in the isolation). Results of methoxyl determination calculated on the ash-free basis are given in the following table:

Reagent with which lignin waste precipitated from s.w.l.	Per cent methoxyl on the ash-free basis
Calcium oxide	10.82
Ethyl alcohol	12.62
Cold 20 per cent H_2SO_4	12.82
Beta naphthylamine (assuming Klason's formula)	13.30

In Table III the lignin content of four samples of s.w.l. is given. Column II contains methoxyl values of s.w.l. solids from which, using the factor 12.8 (per cent methoxyl in s.w.l. lignin) lignin values were computed, and are given in column III. Lignin content of the liquors was also computed using Klason's formula from the weight of naphthylamine ligno-sulphonate precipitates, and is given in column V. In column VI, the lignin values obtained in these two ways are compared.

TABLE III.—LIGNIN CONTENT OF SEVERAL SULPHITE WASTE LIQUOR SAMPLES

				Beta naphthylamine ligno-sulphonate		
S.w.l. sample No.	Total solids gms./l.	Per cent methoxyl in solids	Lignin from methoxyl values gms./l.	Ppt. gms./l.	Lignin part only gms./l.	Per cent lignin pptd. by naphthylamine in terms of that computed from methoxyl
	I	II	III	IV	V	VI
1	118.0	6.67	61.5	72.90	50.0	81.3
2	109.5	6.60	56.4	66.17	45.5	80.7
3	114.8	6.72	60.2	71.94	49.4	82.0
4	138.7	6.42	69.6	85.68	58.9	84.5
					Average	82.1%

When filtrate and washings from the first beta naphthylamine precipitate of a certain sample of s.w.l. were concentrated back to 15 to 20 cc. volume, more precipitation took place. The weight of this second precipitate was about 14 per cent of that of the first one, but its methoxyl content was only 5.87 per cent. The solids in the second filtrate (mostly sugars) after excess of naphthylamine was removed had a methoxyl value of 1.58 per cent. These results are summarized in Table IV.

TABLE IV.—DISTRIBUTION OF METHOXYL

	Weight of ppt. or solids, gms./25 cc.	Per cent methoxyl in ppts.	Weight of methoxyl in ppts., mgms.	Per cent of total methoxyl
First beta naphthylamine precipitate	1.842	9.13	168.0	82.0
Second beta naphthylamine precipitate	0.263	5.87	15.4	7.5
Solids in the second filtrate.	1.367	1.58	21.4	10.5

Table IV confirms the conclusion of Table III that only about 82 per cent of the lignin (as determined by the methoxyl value) is precipitated by naphthylamine, hence the correction factor of 1.22 (100/82) in the Procedure Xa. Table III also shows that the fraction of lignin precipitated in one operation is practically constant, thus justifying the use of the correction factor. Conditions given in Procedure Xa, however, should be carefully followed.

With the apparatus for methoxyl determination available, lignin is readily calculated from methoxyl content of solids, using the factor 0.128. Since Mark Bray *(10)* gives a full description of apparatus and procedure for methoxyl determination, we shall not repeat it here. We have followed his procedure with but one modification: the red phosphorus in the trap was suspended not in plain water, but in five per cent cadmium sulphate solution to remove hydrogen sulphide formed by the reduction by hydrogen iodide of surphur present in s.w.l. solids.

XI. Sugars.

Sugars that are found in s.w.l. are formed from hemi-

celluloses of wood by hydrolysis. The hemicelluloses are often defined as carbohydrate substances other than cellulose; on hydrolysis they give primarily xylose, mannose, and fructose. Since the percentage of hemicelluloses in woods used in pulping runs between 15 to 18 per cent, assuming 50 per cent of wood as pulp, 2000 gallons of liquor per ton of pulp, and complete hydrolysis, s.w.l. should contain (providing there is no destruction of sugars) between 1.74 and 2.08 per cent of sugars. Glucose, which also is sometimes reported as being found in s.w.l., was ascribed by Hägglund (*22*) to hemicellulose glucan; however, most writers believe it to be formed from cellulose (*24*).

The sugar content of s.w.l., as given in the literature by different writers, varies considerably in the total quantities found, as well as in the percentage distribution between different kinds. In experimental cooks Sherard and Suhm (*44*) obtained 2.5 per cent sugar in s.w.l., Hägglund and Johnson (*20*) give sugar information as equal to 15 per cent of the weight of dry wood (equivalent to about 1.7 per cent in the s.w.l.).

Examples of some sugar analyses are given in Table V below.

TABLE V.—REPORTED SUGAR CONTENT OF SULPHITE WASTE LIQUORS

	By Krause (*33*)	By Lattermoser and Mathieson (*35*)	By Hägglund and co-workers (*22*) *
	Per cent	Per cent	Per cent
Total sugar	1.47–1.48	1.390	2.01
Pentoses	0.41–0.47	0.294	0.36
Mannose	0.48	0.457	0.89
Levulose	0.25–0.28	0.129	0.08
Galactose	0.01	0.0	0.08
Dextrose	a trace	0.465	0.60
Others	.....	0.043	...

* Recalculated; original given in per cent of wood.

Although these variations in the s.w.l. sugar content reported above are unquestionably due for the main part to the differences in the wood used, as well as the cooking procedure, it is perhaps also due to the general unreliability of methods of sugar analysis, the same method in the hands of different investigators often giving variable results.

Hägglund and coworkers (*19*), (*21*) working with pure sugars found that when heated with bisulphites they are oxidized to corresponding acids according to the equation:

$$2\ HSO_3 + 2\ C_6H_{12}O_6 = S_2O_3 + 2\ C_6H_{12}O_7 \div H_2O$$

and in this form they do not reduce Fehling solution. Under normal conditions presumably 30 to 40 per cent of sugars of s.w.l. are so changed into the corresponding acids during the cooking of pulp (*18*).

According to Kurtz (*34*), boiling of s.w.l. with dilute mineral acids does not increase its copper number; boiling with alkalies causes reduction of copper number, and only digestion with two per cent sulphuric acid at 120 to 130 deg. C. for two hours increases copper number of s.w.l. from 29.5 to 36.6 and that of ligno-sulphonic acid from 2 to 5.6. We found that heating s.w.l. with calcium oxide (as in the Howard's process) almost completely destroys the reducing property of s.w.l., and that two hour heating at 120 deg. C. with two per cent sulphuric acid increases reducing value of s.w.l. by about 10 per cent and that of lignin by 78 per cent of the original.

Treating s.w.l. for 24 hours at room temperature with an equal volume of 6 N HCl does not change its reducing value, showing that no invertable polysaccharides are present. Lignin isolated with 20 per cent sulphuric acid has a copper reducing value equivalent by weight (on the ash-free basis) to 2.6 per cent of that of glucose. Hägglund (*22*) reports that removal of lignin diminishes the reducing value of s.w.l. by about 25 per cent; our experience was that the reduction is only about 12 to 15 per cent. Because of its reducing properties lignin should be removed from s.w.l. prior to sugar determination. Methods of lignin precipitation have been already discussed under "lignin," where it was stated that beta naphthylamine is the best agent for that purpose; this is also Hägglund's opinion (*22*).

Since all sugars which have been found in s.w.l. belong both to "reducing" and to "fermentable" classes, a single determination of "reducing value" is sufficient for all practical purposes.

Of the large number of methods for determination of reducing sugars tried on s.w.l., that of Bertrand (*9*) proved to be the best. This method has been used also by Kurtz (*34*), Lottermoser (*35*), and by Humm (*27*).

In using Bertrand's method, the usual technic was somewhat modified by us. In place of filtering through Gooch we prefer to use filter paper for filtering cuprous oxide, for no matter how thick the asbestos mat is, in washing it the cuprous oxide gradually works through the filtering medium and passes in to filtrate. Such is not the case when Whatman's No. 42 filter paper is used. In titrating the ferrous ion with permanganate, the end point is vanishing, especially when determination is made of s.w.l. without previous removal of lignin; addition of ice to the titration mixture helps to make the end point more permanent.

RECOMMENDED PROCEDURE XI: SUGARS.

Filtrate and washings from naphthylamine ligno-sulphonate precipitate, Procedure Xa, are made alkaline with NaOH (slight excess) and the precipitated naphthylamine is filtered off and washed with water; discard the precipitate. The combined filtrate and washings are made acid (methyl orange) with HCl and a slight excess of acid added, and concentrated to 75 to 80 cc. Transfer the concentrate quantitatively into 100 cc. volumetric flask and make up to the mark. Determinations are made in duplicate. Place 25 cc. sample of this solution (equivalent to 2.5 cc. of original s.w.l.) in 100-cc. beaker, add 20 cc. of each Fehling solutions "A" and "B" (Staud and Gray (*47*) solutions: "A" has 68.5 grams $CaSO_4 . 5H_2O$ per liter, "B" 346 grams of Rochelle salt and 100 grams NaOH per liter). The mixture is brought to boiling in 3 minutes, with occasional stirring, and then allowed to boil gently for 3 minutes more. A bright red precipitate of cuprous oxide which settles readily in five minutes of standing is obtained. Keeping the precipitated cuprous oxide undisturbed the liquid is decanted through a No. 42 Whatman filter paper. The precipitate is washed three times by decantation with 30 to 35 cc. portions of hot water, allowing the precipitate to settle each time, which it does readily, before decanting. The washing completed, place the beaker containing precipitate under the funnel and dissolve the Cu_2O precipitate by pouring through the filter 20 cc. of ferric sulphate solution, containing 50 grams of $Fe_2(SO_4)_3$ and 100 cc. of 98 per cent sulphuric acid per liter. The solution is poured drop-wise in 5-cc. portions, each followed by washing the filter with cold water. After all cuprous oxide is dissolved, the solution is titrated with 0.1 N $KMnO_4$, until the appearance of the red color of the permanganate throughout the whole solution.

Calculations: Since the exact ratio of reduced copper to sugars depends on many details of the experimental procedure and will vary in different laboratories it can not be given. Each analyst should determine his own factor by making determination of pure glucose under identical conditions.

Using methods here outlined four samples of s.w.l. from different cooks obtained from two different pulp mills were analyzed. The results are summarized in Table VI below.

TABLE VI.—ANALYSES OF FOUR SAMPLES OF SULPHITE WASTE LIQUOR

(Data in grams per liter)

Samples	No. 1	No. 2	No. 3	No. 4
Total solids	118.0	109.5	114.8	138.7
Residue on ignition (as sulphates)	19.01	15.72	16.35	26.73
Total volatile acids	5.31	5.46	4.93	6.41
Formic acids	0.63	0.84	0.65	1.19
Acetic acid	4.68	4.62	4.28	5.22
Molar ratio of acids	1:5.70	1:4.22	1:4.83	1:3.36
Calcium as CaO	7.24	6.71	6.47	9.47
Total sulphur, as S	10.29	10.98	10.85	11.68
Sulphate, as SO_3	2.246	1.304	1.736	2.352
Free SO_3	1.39	5.42	3.43	1.45
Loosely combined SO_3	4.98	6.10	5.50	5.83
Sulphone sulphur, as SO_2	12.41	9.47	11.37	14.18
Permanganate Oxygen Demand	110.0	102.2	104.4	125.0
Methyl alcohol	1.26	1.12	1.01	0.72
Ethyl alcohol	0.171	0.157	0.166	0.230
Acetone	0.134	0.148	0.152	0.099
Furfural	0.285	0.228	0.284	0.244
Lignin	61.5	56.4	60.2	69.6
Total sugars	20.15	20.64	20.10	20.47
Pentoses	2.55	2.74	2.60	3.37
Hexoses	17.6	17.9	17.5	17.1

Acknowledgment

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Pulp and Paper Industry Literature Review

Abstracts of Articles and Patents Compiled by the Abstracts and Bibliography Committee of the Technical Association of the Pulp and Paper Industry, A. Papineau-Couture, John F. Ohlson, C. E. Peterson and Clarence J. West, Chairman

Copies of United States Patents can be obtained from the United States Patent Office, Washington, D. C., for 10 cents each. Send currency, not stamps.

Raw Materials

Use of Eucalyptus (Eucalyptus Globulus) As Raw Material in the Chemical Pulp Industry. A. Da Costa Anis Inst. Sup. Agron. 6, No. 1, 127-141 (1934; Chime & Industrie 33: 1190 (May, 1935).—The composition of **Eucalyptus globulus** on the dry basis is as follows: 0.29% ash, 12.66% lignin, 82.02% total cellulose, of which 50.01% is alpha-cellulose, 5.80% beta-cellulose and 26.18% gamma-cellulose. Completely delignified fibers were obtained by treating with a solution containing 2% combined sulphur dioxide, raising the temperature at the rate of 0.5 kilos every 30 min. to a maximum of 3.5 kilos, which pressure is maintained for two and a half hours. Complete delignuification was obtained by treating with 20% of caustic soda (on the weight of the oven-dry wood) at a concentration of 4%, raising to 163°C. and 7 kilos in 90 minutes, maintaining at 7 kilos for 6 hours, and relieving to 0 kilo (gage) in 90 minutes. The properties and use of **E. globulus** and **E. viminalis** pulps are the same as those of chestnut and esparto pulps. **E. saligna** yields a weaker pulp, and **E. robusta** a rather dark-colored pulp.

Paper Making Tests with Pinus Insignis Wood. L. Vidal, M. Brot and M. Aribert. Papier 38: 619-626 (July, 1935).—The paper making qualities of **Pinus insignis** are similar to those of **Pinus sylvestris.**—A.P. -C.

Separation of Cornstalk into Long Fibers, Pith and Fines. E. R. Whittemore, C. B. Overman and Baker Wingfield. U. S. Natl. But. Standard Miscellaneous Pub. M148 8 p. (1935.)—The wet method of separating pith from cornstalks was modified to produce three fractions. Raw material is first subjected to coarse shredding, following by washing, mechanical processing to separate the pith from the shell and inner fibers, separating pith from long fibers by wet screening and separating pith from "fines" and dirt by water flotation. Data on the ash of the various fractions and thermal conductivity of pith and pith board are given, together with a discussion of possible uses for the materials. Yields are 42.5% long fiber, 5% pith and 22.5% fines.—A.P. -C.

Esparto Papers. Vincent S. Smith. Paper Industry 18: 315-318 (Aug., (1935.)—A brief outline of the pulping of esparto, and of the qualities and uses of esparto pulp.——A.P. -C.

Groundwood and Sulphite Pulp from Southern pine. W. G. MacNaughten. Paper Mill 58, No. 29: 9-14 (July 20, 1935).—An address describing the work carried out to date at the pulp and paper laboratory at Savannah, Ga., toward the production of groundwood and sulphite from Southern pine with a view to the manufacture of newsprint.—A. P. -C.

Bagasse for the Manufacture of Celotex (Artex). 1. Changes in the Constituents of a Pile of the Bagasse. S. Tanaka. J. Agric. Chem. Soc. Japan 10: 1053--058 (1934).—On piling the bagasse for a year in the open air, first the sugar and pectin, and then starch and pentosans were decomposed by fermentation. The decomposition was most rapid deep in the pile, where the temperature was highest.—A. P. -C.

The Problem of Raw Materials. Zellstofffaser 32, No. 4: 49-50 (April, 1935).—General discussion of the problem of sources of raw materials for German requirements.—J. F. O.

New Method for Evaluating Linter by the Ripeness of the fiber and by Calculating the Cellulose Yields on Boiling. A. P. Zakoshchikov. J. Applied Chem. (U. S. S. R.) 7:1197-1205 (1934); C. A. 29:5652.—The ripeness of the linter fiber is determined by mercerizing with a solution of sodium hydroxide, washing with water and dyeing with Congo red. All the fibers are easily distinguished in the mercerized fibers and can be subdivided into four groups by their color after acidification. The ripeness is expressed by the percentages of fibers represented by each group (A-D).

The cellulose yield obtained after boiling the linter is calculated from $Aa + Bb + Cc \div Dd = x$, where $a = 0.97$, $b = 0.65$, $c = 0.53$ and $d = 0.20$, the latter factors indicating the degree of participation of the fibers in the formation of cellulose in boiling, that is, their content in cellulose. A correction for contamination (Z) of the linter is obtained from $x_1 = (100 - Z)/100$.—C. J. W.

Surface Phenomena in the Production of Paper and Cellulose. III Application of a Washing Action and Flotation Phenomena in Deinking of Print Waste. I. I. Kovalevskii. Bumazhnaya Prom. 14, no. 3:16-41 (March, (1935); C. A. 29: 5267.—Various proposed methods for deinking of print waste are not suitable for paper stock composed partly of mechanical wood pulp. The various method of experimental deinking by flotation are based on the hydrophylic properties of the fibrous materials (cellulose, wood pulp, etc.) and the hydrophobic properties of the ink constituents (carbon, mineral oils, asphalt, pitch, etc.). Comparative results, obtained in deinking of various grades of print waste and newsprint by flotation without the use of flotation agents and with hydrocarbons, alkalis, fatty soaps and other reagents, are tabulated and discussed. Deinking by air, oil and air-oil flotation alone produced only fair results, because of some yellow discoloration of the recovered paper stock. A general flotation technic previously used for the removal of resinous matter from print waste was followed. By the method of reworking the waste with a rosin soap and subsequent flotation with the use of kerosene, a complete restoration of the whiteness equal to that of the original unprinted paper was attained with a consumption of only 3 per cent rosin and 1.5-3 per cent kerosene. A waste, composed of 75-80 per cent of unbleached stock (low grades of print paper and newsprint) and 15-25 per cent of bleached pulp, treated by this method, and then filled with kaolin (to 14-15 per cent ash content) resulted in a paper whiteness superior to the fresh, unprinted stock. The deinking by the flotation process is characterized by the separation of the paper mass in 2 sorts, viz., purified, light colored fiber (tailings) and a darker mass (flotant.) The mixture of the two when used in the production of wrapping paper and fiberboard results in only 5% loss of the waste recovered by flotation. The flotant consists mostly of kaolin and fine mechanical wood pulp.—C. J. W.

Removal of Printing Ink from Paper. L. L. Alstead. Brit. pat. 426, 841. (April 13, 1934).—Printed paper is treated in a rod mill at 12 to 33% consistency, so as to form pellets of loosely held fibers. These are then treated in a tank with concentrated solution of sulphur dioxide (about 1.8% SO_2) and then with a more dilute solution (about 0.5% SO_2). The sulphur dioxide solution is introduced into the bottom of the tank and allowed to diffuse upwards through the pulp pellets, which are finally washed with water acidified with sulphuric acid.—A. P. -C.

Process for Deinking Printed Paper.. Pierre R. Hines. U. S. pat. 2,005,742. (June 25, 1935).—Waste paper is defiberized in a broke beater, treated with reagents having detergent and collecting properties (*e.g.*, caustic soda and quicklime), cooked till the fibers are freed from ink particles, diluted to a consistency of about 1.25%, treated with suitable froth-forming reagent (*e.g.*, kerosene, Du Pont Frother and soluble starch) and passed through a flotation machine in which the froth produced entrains the liberated pigment and oil particles.—A. P. -C.

Cellulose and Lignin

The Hemicelluloses. I. Alcoholic Sodium Hydroxide as a Pretreatment to Extraction. Arthur G. Norman. Biochem. J. 29: 945-952 (1935).—The treatment of materials with 1 per cent caustic soda in alcohol of concentrations up to 90% at 100°C. to remove lignins may give as much as 50% loss in the hemicellulose content. In the cold, the caustic soda removes less hemicellulose in 70% or 90% alcohol, but appreciable amounts in 50% or weaker alcohol. However, the amount of lignin removed is also low. The use of 1% caustic soda in 50% alcohol should consequently be ruled out as a pretreatment in the preparation or estimation of hemicellulose.—A P. -C.

Entering of Water in the Crystal Lattice of Cellulose. Ichre Sakurada and Keiroku Fuchino. Bull. Inst. Phys. —Chem. Research (Tokyo) 14: 171-176 (19353.—Ramie fiber dipped into 18% caustic soda (by volume) at ordinary temperature and washed 2 hrs. with distilled water until completely free from alkali, gives an x-ray pattern quite different from that of natural cellulose, cellulose hydrate or unwashed sodium cellulose I; this verifies the entrance of water into the lattice of cellulose. In such cellulose, water is thought to be combined with cellulose forming a true water-cellulose compound; some of the sodium cellulose IV of Schramek and sodium cellulose III' of Trogue and Hess seems to be nothing but this water-cellulose compound. —A. P. -C.

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X-Ray Diffraction Patterns of Cellulose Particles and Interpretation of Cellulose Diffraction Data. Wanda K. Farr and Wayne A. Sisson. Contrib. Boyce Thompson Inst. 6: 315-321 (1934).—Diffraction phenomena hitherto explained by the supposed existence of a micellar structure may be accounted for by the visible particles of cellulose occurring as units in young fibers and subsequently united by noncellulose cementing substances to form fibrils. In the latter the individual particles cannot be observed.—A. P. -C.

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IMPORTS OF PAPER AND PAPER STOCK

NEW YORK, BOSTON, PHILADELPHIA AND OTHER PORTS

NEW YORK IMPORTS

WEEK ENDING FEBRUARY 8, 1936

CIGARETTE PAPER

American Tobacco Co., Indep. Hall, Bordeaux, 1 cs.; H. H. Strauss, Indep. Hall, Bordeaux, 267 cs.; Champagne Paper Corp., Lafayette, Havre, 955 cs.; Standard Products Corp., Lafayette, Havre, 24 cs.; R. J. Reynolds Tobacco Co., Washington, Havre, 150 cs.

WALL PAPER

———, Europa, Bremen, 2 cs.; W. H. S. Lloyd & Co., Maasdam, Rotterdam, 1 cs.; F. J. Emmerich, Georgic, Liverpool, 3 bls.; ———, Andania, London, 7 cs., 14 bls.; F. Blank, Washington, Havre, 10 cs.

NEWSPRINT

———, Bergensfjord, Oslo, 13 bls., 291 rolls; N. Y. Evening Journal, Markland, Liverpool, N. S., 286 rolls; N. Y. Tribune, Markland, Liverpool, N. S., 1356 rolls; World-Telegram, Markland, Liverpool, N. S., 597 rolls; Brooklyn Daily Eagle, Markland, Liverpool, N. S., 80 rolls; Clinton Paper Co., Markland, Liverpool, N. S., 413 rolls; Jay Madden Corp., American Traveler, Hamburg, 62 rolls; Jay Madden Corp., Washington, Hamburg, 476 rolls.

PRINTING PAPER

Burroughs Wellcome & Co., Georgic, Liverpool, 3 bls.

WRAPPING PAPER

Standard Products Corp., Black Gull, Antwerp, 15 rolls; M. M. Cohen, American Traveler, Hamburg, 290 rolls, 38 bls.; H. Reeve Angel & Co., Inc., Pennland, Antwerp, 3 cs.; ———, Excalibur, Genoa, 11 bls.

FILTER PULP

Gerhard & Hey, Maasdam, Rotterdam, 55 cs.

FILTER PAPER

H. Reeve Angel & Co., Inc., Majestic, Southampton, 14 cs.; H. Reeve Angel & Co., Inc., Andania, London, 21 cs.

DRAWING PAPER

Japan Paper Co., American Banker, London, 1 cs.

SURFACE COATED PAPER

Gevaert Co. of America, Black Gull, Antwerp, 31 cs.; Gevaert Co. of America, Pennland, Antwerp, 37 cs.; ———, Europa, Bremen, 2 cs.

BASIC PAPER

Dingelstedt & Co., Europa, Bremen, 10 cs.

DECALCOMANIAS

Sellers Transportation Co., Europa, Bremen, 9 cs.; ———, Europa, Bremen, 2 cs.

DECALCOMANIA PAPER

B. F. Drakenfeld & Co., Georgic, Liverpool, 37 cs. (duplex.)

TRACING CLOTH

C. Bruning & Co., Europa, Bremen, 39 cs.

NOTE PAPER

T. N. Fairbanks, Majestic, Southampton, 1 cs.

GUMMED PAPER

Meadows Wye & Co., Majestic, Southampton, 2 cs.

CARD BOARD

———, Alberta, Trieste, 34 bls.; Rohner Gehrig & Co., Washington, Hamburg, 60 bls.

STRAW BOARDS

———, Maasdam, Rotterdam, 96 rolls.

MISCELLANEOUS PAPER

Japan Paper Co., Tai Shan, Kobe, 80 cs.; Keuffel & Esser Co., Washington, Hamburg, 52 cs.; Coty Processing Co., Washington, Havre, 4 cs.; ———, H. Jaspar, Antwerp, 32 cs.

RAGS, BAGGING, ETC.

E. J. Keller Co., Inc., Indep. Hall, ———, 64 bls. rags; Castle & Overton, Inc., Indep. Hall, Bordeaux, 53 bls. rags; Bank of Manhattan Co., Indep. Hall, St. Nazaire, 18 bls. new cuttings; ———, Alberta, Trieste, 150 bls. bagging; Loumar Textile By-Products Co., Maasdam, Rotterdam, 89 bls. bagging; Great Eastern Packing & Paperstock Co., Maasdam, Rotterdom, 88 bls. bagging; ———, Maasdam, Rotterdam, 767 bls. cotton waste; Amtorg Trading Corp., Black Gull, Antwerp, 55 bls. flax waste; Royal Manfg. Co., Black Gull, Antwerp, 62 bls. cotton waste; N. Schwab & Sons, Inc., Black Gull, Antwerp, 165 bls. cotton waste; ———, Black Gull, Antwerp, 208 bls. rags; Cotton Products Co., Black Gull, Antwerp, 63 bls. cotton waste; E. J. Keller Co., Inc., Black Gull, ———, 227 bls. bagging; O'Brien Padawer Co., Belfast Maru, Shanghai, 250 bls. cotton waste; W. Garretson, Belfast Maru, Shanghai, 72 bls. rags; J. J. Ryan & Son, Belfast Maru, Shanghai, 300 bls. cotton waste; American Cotton Products Co., Belfast Maru, Shanghai, 50 bls. cotton waste; Royal Manfg. Co., Belfast Maru, Kobe, 50 bls. thread waste; O'Brien Padawer Co., Belfast Maru, Kobe, 150 bls. cotton waste; ———, Belfast Maru, Shanghai, 50 bls. pickers; Boyer Cotton Products Co., Hoegh Carrier, Kobe, 275 bls. cotton waste; O'Brien Padawer Co., Hoegh Carrier, Kobe, 50 bls. cotton waste; Royal Manfg. Co., Hoegh Carrier, Kobe, 50 bls. cotton waste; ———, American Traveler, Hamburg, 62 bls. rags; Banco Com'l Italiane Trust Co., Pennland, Antwerp, 185 bls. bagging; Banco Com'l Italiane Trust Co., Pennland, Antwerp, 349 bls. jute waste; Irving Trust Co., Pennland, Antwerp, 227

bls. jute waste; E. J. Keller Co., Inc., Pennland, ———, 115 bls. bagging; S. Birkenstein & Son, Inc., Olympia, Barcelona, 109 bls. bagging; ———, Olympia, Barcelona, 84 bls. bagging; ———, Olympia, Barcelona, 79 bls. dark cottons; J. F. Keene, Olympia, Barcelona, 169 bls. rags; E. J. Keller Co., Inc., Olympia, ———, 125 bls. rags; New England Waste Co., Tai Shan, Kobe, 400 bls. bagging; ———, Tai Shan, Kobe, 250 bls. cotton waste; Manufacturers Trust Co., Black Falcon, Rotterdam, 59 bls. bagging; Banco Com'l Italiane Trust So., Black Falcon, Rotterdam, 63 bls. bagging; ———, Black Falcon, Rotterdam, 172 bls. pickers; Darmstadt Scott & Courtney, Marin Sanudo, Genoa, 422 bls. bagging; Darmstadt Scott & Courtney, Giulia, Venice, 196 bls. bagging; ———, American Banker, London, 29 bls. rags; Irving Trust Co., H. Jaspar, Antwerp, 126 bls. bagging; E. J. Keller Co., Inc., Excalibur, ———, 66 bls. rags, 14 bls. bagging; E. J. Keller Co., Inc., Spaarndam, ———, 61 bls. bagging; E. J. Keller Co., Inc., Estrella, ———, 98 bls. bagging; E. J. Keller Co., Inc., Quaker City, ———, 75 bls. paper stock.

OLD ROPE

Manufacturers Trust Co., American Banker, London, 48 coils; W. Steck & Co., Excalibur, Marseilles, 39 coils.

CASEIN

———, Indep. Hall, Bordeaux, 350 bags, 25,435 kilos; Chase National Bank, Indep. Hall, Bordeaux, 715 bags, 50,870 kilos; ———, American Banker, London, 134 bags; National City Bank, American Banker, London, 200 bags; Chase National Bank, Lafayette, Havre, 267 bags; Swift & Co., Northern Prince, B. Ayres, 339 bags.

WOOD PULP

———, Bergensfjord, Sarpsborg, 300 bls. sulphite; J. Andersen & Co., Bergensfjord, Oslo, 2085 bls. sulphite; Bank of N. Y. Trust Co., Bergensfjord, Halden, 150 bls. sulphite; The Borregaard Co., Inc., Bergensfjord, Sarpsborg, 608 bls. sulphate Lagerloef Trading Co., Kolsnanen, Wiborg, 1260 bls. sulphate; ———, Black Falcon, Rotterdam, 960 bls. wood pulp, 192 tons; Castle & Overton, Inc., Black Falcon, Rotterdam, 310 bls. wood pulp, 52 tons; ———, Washington, Hamburg, 106 bls. wood pulp, 11 tons; M. Sone, Washington, Hamburg, 1177 bls. wood pulp, 184 tons; Gottesman & Co., Inc., Hansa, Czechoslovakia, 648 bls. wood pulp, 100 tons.

PORTLAND IMPORTS

WEEK ENDING FEBRUARY 8, 1936

Gottesman & Co., Inc., America, Sweden, 3500 bls. wood pulp.

BOSTON IMPORTS

WEEK ENDING FEBRUARY 8, 1936

———, Alberta, Trieste, 70 bls., card board; Stone & Downer Co., Georgic, Liverpool, 24 cs. printing paper; G. F. Malcolm, Inc. Georgic, Liverpool, 2 cs. tissue paper; Royal Manfg. Co., Hoegh Carrier, Shanghai, 50 bls. cotton waste; Union Trust Co., Hoegh Carrier, Shanghai, 334 bls. rags; O. Smith & Son, Hoegh Carrier, Shanghai, 160 bls. cotton waste; ———, Tai Shan, Kobe, 500 bls. bagging; Elliott Addressing Machine Co., Tai Shan, Yokohama, 4 cs. paper; E. J. Keller Co., Inc., Excalibur, ———, 217 bls. rags; Atkinson Haserick & Co., Excalibur, Genoa, 5 cs. paper; ———, Excalibur, Marseilles, 28 bls. rags; Gottesman & Co., Inc., America, Sweden, 250 bls. wood pulp; Parsons & Whittemore, Inc., Chemnitz, ———, 1325 bls. wood pulp.

PHILADELPHIA IMPORTS

WEEK ENDING FEBRUARY 8, 1936

Castle & Overton, Inc., Indep. Hall, Bordeaux, 277 bls. rags; Castle & Overton, Inc., Indep. Hall, St. Nazaire, 85 bls. rags; J. T. Flannery, Indep. Hall, St. Nazaire, 154 bls. rags; E. J. Keller Co., Inc., Indep. Hall, ———, 290 bls. rags; Castle & Overton, Inc., Indep. Hall, Havre, 401 bls. rags; Lang Paper Co., Indep. Hall, Havre, 241 bls. rags; ———, Indep. Hall, Havre, 268 bls. rags; Union Waste Co., Belfast Maru, Kobe, 40 bls. rags; O. Smith & Son, Belfast Maru, Shanghai, 375 bls. cotton waste; Royal Manfg. Co., Belfast Maru, Shanghai, 150 bls. cotton waste; Darmstadt Scott & Courtney, Hoegh Carrier, Kobe, 10 bls. cotton waste; J. T. Flannery, Excalibur, Alexandria, 28 bls. rags; F. Weber & Co., Exporter, Genoa, 7 cs. drawing paper; E. J. Keller Co., Inc., Sarcoxie, ———, 95 bls. paper stock.

BALTIMORE IMPORTS

WEEK ENDING FEBRUARY 8, 1936

Congoleum Nairn Co., Indep. Hall, Bordeaux, 165 bls. rags; Congoleum Nairn Co., Indep. Hall, St. Nazaire, 49 bls. rags; Congoleum Nairn Co., Indep. Hall, Havre, 968 bls. rags; ———, Tai Shan, Yokohama, 125 bls. rags; ———, Black Falcon, Rotterdam, 1000 bls. wood pulp, 213 tons; ———, Black Falcon, Rotterdam, 200 bls. pulp boards, 50 tons; Castle & Overton, Inc., Black Falcon, Rotterdam, 1793 bls. wood pulp, 303 tons; Congoleum Nairn Co., Black Falcon, Antwerp, 314 bls. rags; Congoleum Nairn Co., Exporter, Marseilles, 665 bls. rags; Parsons & Whittemore, Inc., City of Havre, ———, 540 bls. wood pulp.

NORFOLK IMPORTS

WEEK ENDING FEBRUARY 8, 1936

N. Y. Trust Co., Indep. Hall, Havre, 190 bls. bagging; Loumar Textile By-Products Co., Maasdam, Rotterdam, 72 bls. bagging; E. Butterworth & Co., Inc., Black Falcon, Antwerp, 1559 bls. bagging; W. Steck & Co., Black Falcon, Antwerp, 95 bls. rags.

NEW ORLEANS IMPORTS

WEEK ENDING FEBRUARY 8, 1936

D. M. Hicks, Inc., Belfast Maru, Kobe, 200 bls. bagging; Gottesman & Co., Inc., Karpfanger, Sweden, 3600 bls. wood pulp.

SAVANNAH IMPORTS

WEEK ENDING FEBRUARY 8, 1936

J. J. Ryan & Son, Hoegh Carrier, Sheanghai, 50 bls. cotton waste.

GALVESTON IMPORTS

WEEK ENDING FEBRUARY 8, 1936

Burke Bagging Co., Belfast Maru, Kobe, 800 bls. bagging.

Inspirations for Printers

The West Virginia Pulp and Paper Company has just issued its Westvaco Inspirations for Printers, Series 1934-1935. This is a most interesting and extremely helpful book. As the name indicates, page after page is presented in plain black and white as well as in many colors of most attractive advertising matter that cannot fail to furnish inspiration to printers everywhere who desire to keep up to date.

New York Market Review

Office of the PAPER TRADE JOURNAL,
Wednesday, February 12, 1936.

Despite inclement weather conditions, the local paper market continues fairly active. Demand for the various standard grades of paper is well up to average for the time of year. Sales forces of the leading paper organizations are optimistic regarding the future. Prices are holding to previously quoted levels, in most instances.

The newsprint paper market is exhibiting a strong undertone. Sentiment is gradually improving and it is freely predicted that consumption will be heavier during the current year than in 1935, due to various factors which are generally well known in the industry. The price situation continues unchanged, although the spot market is firmer.

Steadiness prevails in the fine paper market. Demand for book, cover, bond and ledger papers is well sustained. Prices are holding to scedule. Tissues are moving in good volume. The coarse paper market is displaying strength, with kraft wrapping paper and specialties in excellent request. The paper board mills are resuming normal operations.

Mechanical Pulp

The ground wood pulp market is arousing more interest. Production in the United States, Canada and abroad is being maintained in ample volume to meet current requirements. Stocks at the pulp mills, however, are not excessive. While domestic ground wood pulp remains unchanged, No. 1 imported mechanical pulp is quoted at $22 to $23 per ton, on dock, Atlantic ports.

Chemical Pulp

Conditions in the chemical pulp market are satisfactory. The strength of kraft pulp continues the bright, particular feature of the industry. Offerings are very scarce and orders are being booked from the paper mills for 1937 delivery in fairly good volume. Domestic and foreign bleached sulphite are also very strong, while other grades are steady.

Old Rope and Bagging

The old rope market is sharing the general business improvement. Demand for domestic and imported old manila rope is better, and quotations have advanced slightly. Mixed strings are practically unchanged. The bagging market is fairly buoyant. Scrap and gunny bagging are moving freely, while roofing bagging is in seasonal request.

Rags

Trading in the domestic rag market is brisk. New cotton rags are in good request from the paper mills. No. 1 new white shirt cuttings are now quoted at 8.00 to 8.15; No. 1 white silesias at 5.50 to 5.75; new unbleached at 8.25 to 8.50 and fancy shirt cuttings at 3.00 to 3.25. Demand for roofing grades is normal for the season.

Waste Paper

The paper stock market is fairly buoyant. Board mill demand for the lower grades is better than of late. Offerings are scarcer, as collections have been retarded by the severe weather experienced during the last few weeks. Prices of the lower grades are inclined to be firmer. The better grades of waste paper are holding to schedule.

Twine

While most of the business transacted in the local twine market during the past week was routine, the position of the industry is practically unchanged. Demand for the various varieties is about normal for the season, and trading is expected to become more lively in the near future. No radical price changes have been reported.

Arthur D. Little, Inc. Elects Officers

Arthur D. Little, Inc., chemists and engineers of Cambridge, Mass., announced the election of Thorne L. Wheeler as vice-president. Mr. Wheeler graduated from Yale in 1909 and from Massachusetts Institute of Technology in 1911. Following graduation, he went with the Southern Cotton Oil Company as chemist and had become works superintendent at the time of the War, when he served in the Chemical Warfare Service as major in the Technical Development Department on the large scale development of charcoal and soda lime manufacture for gas masks. He then became partner with Wheeler and Woodruff, consulting chemical engineers, joining Arthur D. Little, Inc., in 1925.

The company also announced the re-election of Earl P. Stevenson, president, Raymond Stevens, vice-president, Alexander Whiteside, secretary, and Roger C. Griffin, treasurer.

Michigan Paper Co. Elects Officers

KALAMAZOO, Mich., February 10, 1936—The Michigan Paper Companey elected Dwight L. Stocker, Kalamazoo, president and general manager at its annual meeting in Plainwell and renamed all present members of the board of directors. Mr. Stocker was elected to fill the place of the late G. W. Gilkey, who was killed in an automobile accident last year.

C. C. Wagner was re-elected vice-president, and P. C. Servass was renamed vice-president and sales manager. Others named were C. A. Braginton, treasurer; H. Clair Jackson, secretary; and F. L. Brown, assistant secretary and treasurer.

The board of directors is as follows: H. Clair Jackson, L. H. Kirby, W. J. Lawrence, Guy B. Woodruff, and Stocker, all of Kalamazoo; Henry Pilgrim and A. C. Keppell, Holland; E. W. Stone, Allegan; C. J. Woodhams, C. C. Wagner, and O. O. Stone, Plainwell.

Miscellaneous Markets

Office of the PAPER TRADE JOURNAL,
Wednesday, February 12, 1936.

BLANC FIXE.—The position of the blanc fixe market is practically unchanged. Prices are generally holding to schedule. The pulp is quoted at $42.50 to $45 per ton, in bulk; while the powder is selling at 3½ to 3¾ cents per pound, in barrels, at works.

BLEACHING POWDER.—Steadiness prevails in the bleaching powder market. The contract movement is fairly heavy for the season. Prices are firm and reports of shading are infrequent. Bleaching powder is quoted at $2 to $2.25 per 100 pounds, in drums, at works.

CASEIN.—The casein market stronger, with offerings limited. Domestic standard ground is quoted at 15 and finely ground at 15½; Argentine and French standard ground at 14¼ and finely ground at 14½ cents per pound, in bags, car lot quantities.

CAUSTIC SODA.—Demand for caustic soda is slightly irregular at present. Prices are maintained at formerly quoted levels. Solids caustic soda is selling at $2.55 to $2.60; while the flake and ground are offered at $2.95 to $3 per 100 pounds, in drums, at works.

CHINA CLAY.—The china clay market is exhibiting a strong undertone. Contract shipments are moving in good volume. Imported china clay is quoted at $13.50 to $21 per ton, ship side; while domestic paper making clay is selling at $6.50 to $12 per ton, at mine.

CHLORINE.—Paper mill demand for chlorine is fairly persistent. Shipments against contract are going forward regularly. Prices are holding to formerly quoted levels. Chlorine is quoted at $2.15 to $2.55 per 100 pounds, in tanks, or multi-unit cars, at works.

ROSIN.—The rosin market is steadier than of late. Paper making gum rosin is quoted at $4.25 and wood rosin at $4.30 per 280 pounds, gross weight, in barrels, at Savannah. Seventy per cent rosin size is selling at $2.52 per 100 pounds, in tank cars, at works.

SALT CAKE.—Business in the salt cake market is fairly active. The contract movement is well up to average for the season. Salt cake is quoted at $12 to $13; chrome salt cake at $11 to $12 per ton, at works. Imported salt cake is selling at $12 to $13 per ton, ship side.

SODA ASH.—The soda ash market continues to display strength. Supplies are moving into consumption freely. Prices remain unchanged. Quotations on soda ash, in car lots, at works, per 100 pounds, are as follows: in bulk, $1.05; in bags, $1.20; and in barrels, $1.50.

STARCH.—No radical changes transpired in the starch market. Demand from the paper mills is moderately active. Prices are well maintained. Special paper making starch is still quoted at $3 per 100 pounds, in bags; and at $3.27 per 100 pounds, in barrels, at works.

SULPHATE OF ALUMINA.—Conditions in the sulphate of alumina market are satisfactory. Demand from the paper mills is well sustained. Prices continue firm. Commercial grades are quoted at $1.35 to $1.50 and iron free at $1.90 to $2.05 per 100 pounds, in barrels, at works.

SULPHUR.—The sulphur market continued steady. On yearly contracts, sulphur is quoted at $18 per long ton, in bulk, on orders of 1,000 tons, or over; and at $20 per ton on any smaller quantity. On spot and nearby carloads, the quotation is $21 per ton, in car lots, at mine.

TALC.—Trading in the talc market is fairly active for the time of year. Prices are holding to previously quoted levels, without difficulty. Domestic talc is quoted at $16 to $18 per ton, at eastern mines; while imported talc is selling at $23 to $30 per ton, on dock.

Market Quotations

Paper

Rag Content Bond & Ledgers—

Delivered Zone 1	Bonds	Ledgers
100% Rag Ext. No. 1	.36	.37
100% Rag	.28	.29
75% Rag	.21	.22
65% Rag	.18	.19
50% Rag	.15	.16
25% Rag	.12½	.13½

Sulphite Bond & Ledgers—

Delivered Zone 1	Bonds	Ledgers
No. 1 Sulphite	7.75	8.75
No. 2 Sulphite	6.75	7.75
No. 3 Sulphite	6.00	7.00
No. 4 Sulphite	5.50	6.50

Book, Cased—		
S. & S. C.	5.35 @	5.75
S. & S. C. Litho.	5.60 @	6.00
M. F.	5.10 @	5.50
Coated and Enamel	5.90 @	6.55
Coated Litho	5.90 @	6.55
Tissues—Per Ream—		
White No. 1	.82½ @	—
White No. 1 M. G.	.77½ @	—
White No. 1½	.62½ @	—
White No. 2	.60 @	—
Anti-Tarnish M. G.	.67½ @	—
Colored	.80 @	—
Kraft	.67½ @	—
Manila	.60 @	—
Unbleached Toilet	2.60 @	3.30
Bleached Toilet	3.94 @	5.26
Paper Towels—		
Unbleached	2.10 @	3.35
Bleached	3.30 @	3.70
Manila—		
No. 1 Jute	9.00 @	9.25
No. 2 Jute	7.75 @	8.50
No. 1 Wood	4.00 @	5.25
No. 2 Wood	3.50 @	4.00
Fibre Papers—		
No. 1 Fibre	4.25 @	5.50
No. 2 Fibre	4.00 @	4.75

(Delivered New York)

News, per ton—		
Roll, contract	41.00 @	—
Sheets	46.00 @	—
Kraft—		
No. 1 Northern	4.12½ @	4.75
Standard	4.00 @	—
Southern	3.87½ @	—
Boards—per ton—		
News	37.50 @	—
Chip	37.50 @	—
Sgl. Mla. Ll. Chip.	42.50	@45.00
Jute Lined Chip	42.50	@45.00
Kraft Liners	57.50	@60.00
White Patent Coated	55.00	@57.50
Binders Boards	67.00	@75.00

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—		
Moist	22.00	@23.00
Dry	22.00	@23.00
(F. o. b. Mill)		
No. 1 Domestic and Canadian	18.00	@24.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—		
Division 1	2.60 @	2.90
Division 2	2.55 @	—*
Division 3	2.50 @	—*
Prime Qualities—		
Class 1. All Prime Easy Bleaching	2.05 @	—*
Other Than Easy Bleaching—		
Class 2. Higher than Standard	2.00 @	—*
Class 3, Standard	1.95 @	—*
Class 4, Lower than Standard	1.90 @	—*
(On Dock, Atlantic Ports)		
Kraft No. 1	1.80 @	1.95
Kraft No. 2	1.65 @	1.75
(F. o. b. Pulp Mill)		
Kraft Domestic	1.75 @	1.80
(Delivered)		
Soda Bleached	2.50 @	—

* Add 60 Cents per short ton, dock charges, for Albany; $2.00 for Lake Ports East and $3.00 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—		
New White, No. 1.	8.00 @	8.15
Silesias No. 1	5.50 @	5.75
New Unbleached	8.25 @	8.50
New Soft Blacks	3.75 @	4.00
Blue Overall	5.75 @	6.00
Fancy	3.00 @	3.25
Washables	2.00 @	2.25
Mixed Khaki Cuttings	3.25 @	3.50
O. D. Khaki Cuttings	4.00 @	4.25
Men's Corduroy	2.00 @	2.25
New Mixed Blacks	2.75 @	3.00

Old Rags

White, No. 1—		
Repacked	3.00 @	3.50
Miscellaneous	2.75 @	3.25
White, No. 2—		
Repacked	1.75 @	2.25
Miscellaneous	1.50 @	1.75
Thirds and Blues—		
Repacked	1.75 @	1.85
Miscellaneous	1.45 @	1.55
Roofing Rags—		
No. 1	1.75 @	1.80
No. 2	1.50 @	1.60
No. 3 (bagging)	1.20 @	1.30
No. 4	.95 @	1.00
No. 5A	.90 @	1.00

Foreign Rags

New Rags

New Dark Cuttings	2.00 @	2.25
New Mixed Cuttings	1.80 @	1.90
New Light Silesias	3.75 @	4.00
Light Flannelettes	4.25 @	4.50
New White Cuttings	6.50 @	7.00
New Light Oxfords	3.25 @	3.50
New Light Prints	2.75 @	3.00

Old Rags

No. 1 White Linens	7.50 @	8.00
No. 2 White Linens	6.50 @	7.00
No. 3 White Linens	4.50 @	5.00
No. 4 White Linens	2.25 @	2.50
No. 1 White Cotton	4.25 @	4.75
No. 2 White Cotton	3.25 @	3.75
No. 3 White Cotton	2.50 @	2.75
No. 4 White Cotton	1.90 @	2.15
Extra Light Prints	2.00 @	2.25
Ord. Light Prints	1.75 @	1.85
Med. Light Prints	1.55 @	1.65
Dutch Blue Cottons	2.00 @	2.25
French Blue Linens	2.30 @	2.40
German Blue Linens	2.15 @	2.25
German Blue Cottons	1.70 @	1.80
Checks and Blues	1.70 @	1.80
Linsey Garments	1.95 @	2.05
Dark Cottons	1.80 @	1.90
Old Shopperies	1.00 @	1.05
New Shopperies	1.25 @	1.35
French Blues	2.00 @	2.25

Old Rope and Bagging

(Prices to Mill f. o. b. N. Y.)

Gunny No. 1—		
Foreign	2.20 @	2.25
Domestic	2.25 @	2.35
Wool Tares, light	1.75 @	2.00
Wool Tares, heavy	2.25 @	2.35
Bright Bagging	1.75 @	1.80
Manila Rope—		
Foreign	2.35 @	2.40
Domestic	2.25 @	2.30
Mixed Strings	.85 @	1.00
New Burlap Cut	2.00 @	2.25
Hessian Jute Threads—		
Foreign	2.60 @	2.75
Domestic	2.80 @	3.00

Old Waste Papers

(F. o. b. New York)

Shavings—		
White Envelope Cuttings	2.55 @	2.65
Ordinary Hard White No. 1	2.20 @	2.30
Hard White No. 2	2.05 @	2.15
Soft White No. 1	2.00 @	2.10
Flat Stock—		
Stitchless	.65 @	.75
Over issue Mag	.65 @	.75
Solid Flat Book	.55 @	.60
Crumpled No. 1	.35 @	.40
Solid Book Ledger	1.50 @	1.65
Ledger Stock	.85 @	.90
New B. B. Chips	.30 @	.35
Manilas—		
New Env. Cut	1.70 @	1.80
New Cuttings	1.35 @	1.45
Bogus Wrapper	.40 @	.50
Old Kraft Machine—		
Compressed bales	1.20 @	1.30
News—		
No. 1 White News	1.45 @	1.50
Strictly Overissue	.50 @	.55
Strictly Folded	.35 @	.37½
No. 1 Mixed Paper	.25 @	.27½

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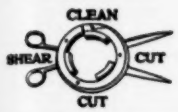

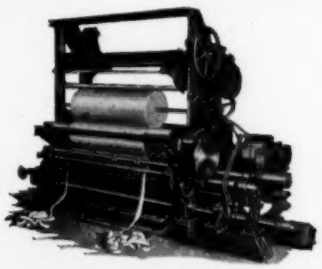

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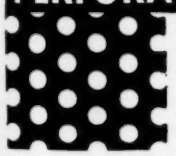

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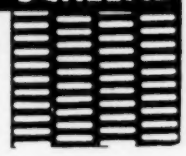

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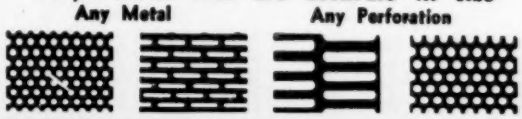

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Twines

(F. o. b. Mill)

(Soft Fibre)

Coarse Polished—

India	.13¼	@	.15¾
Belg. White Hemp	.14¾	@	.17¾
India Compress	.13¾	@	.14¾

Fine Polished—

Fine India	.21½	@	.23½
Special	.19½	@	.21½

Unpolished—

Box	.12	@	.12½
Paper Makers	.09	@	.13½
Tube Rope	.10	@	.15½
Wall Paper	.11	@	.14½
Wrapping	.15½	@	.21
Special	.15	@	.15½
Soft Fiber Rope	.12½	@	.12¾

(Hard Fibre)

Bond	.12	@	.20½
Anchor	.11½	@	.13
Manila	.21	@	.2[illegible]

CHICAGO

Paper

(F. o. b. Mill)

Rag Bond	.12	@	.40
Water Marked Sulphite Bond	.06¾	@	.11
Sulphite Bond	.05½	@	.07¼
Superfine Writing	.18	@	.24
No. 1 M. F. Book	.06½	@	.07¼
No. 2 M. F. Book	.05¼	@	.06¼
No. 1 S.&S.C. Book	.06¾	@	.07¾
No. 2 S.&S.C. Book	.05¾	@	.06½
Coated Book	.07	@	.12
Coated Label	.07	@	.08½
No. 1 Manila	.04¾	@	.05¾
No. 1 Fibre	.04¾	@	.05¼
No. 2 Manila	.04¼	@	.04¾
Butcher's Manila	.03¾	@	.03¾
No. 1 Kraft	4.75	@	5.00
Southern Kraft	3.88	@	4.25
No. 2 Kraft	3.88	@	4.25
Wood Tag Boards	.04¼	@	.06¼
Sulphite Screenings	.03	@	.03¼
Manila Tissue	.05¾	@	.07
White Tissue	.07	@	.09

(Delivered Central Territory)

News, per ton—			
Rolls, contract	42.00	@	—
Sheets, open	47.00	@	—
Boards, per ton—			
Plain Chip	46.50	@	—
Solid News	50.00	@	—
Manila Lined Chip	55.00	@	—
Patent Coated	65.00	@	—

Container Lined—

85 Test, per 1000 sq. ft.	1.70		
100 Test, per 1000 sq. ft.	1.85		

Old Papers

(F. o. b. Chicago)

Shavings—

No. 1 White Envelope Cuttings	1.70	@	2.00
No. 1 Hard White	1.40	@	1.65
No. 1 Soft White	1.25	@	1.50
Ledger & Writings	.70	@	.80
Solid Books	.60	@	.70
Blanks	1.00	@	1.05
Krafts	.80	@	.90
New Kraft Cuts	1.20	@	1.30
Manila Env. Cuts	1.25	@	1.30
Ex. No. 1 Manila	.90	@	1.00
Print Manila	.40	@	.50
Overissue News	.40	@	.45

Old Newspapers—

No. 1	.30	@	.35
No. 1 Mixed Paper	.25	@	.30

Roofing Stocks—

No. 1	30.00	@	—
No. 2	28.00	@	—

PHILADELPHIA

Paper

Rag Content Bond & Ledgers—Delivered Zone 1

	Bonds	Ledgers
100% Rag Ext. No. 1	.36	.37
100% Rag	.28	.29
75% Rag	.21	.22
65% Rag	.18	.19
50% Rag	.15	.16
25% Rag	.12½	.13½

Sulphite Bond & Ledgers—Delivered Zone 1

	Bonds	Ledgers
No. 1 Sulphite	7.75	8.75
No. 2 Sulphite	6.75	7.75
No. 3 Sulphite	6.00	7.00
No. 4 Sulphite	5.50	6.50

F.o.b. Mill

Book, M. F.	5.00	@	—
Book, S. S. & C.	5.25	@	—
Book, Coated	6.15	@	—
Coated Lithograph	6.15	@	—
No. 1 Jute Manila	10.50	@	—
Manila Sul., No. 1	6.75	@	—
Manila No. 2	4.25	@	—
No. 1 Kraft	6.00	@	—
Southern Kraft	5.00	@	—
News Print Rolls	40.00	@	—
Straw Board	40.00	@	45.00
News Board	40.00	@	—
Chip Board	37.50	@	—
Wood Pulp Board	70.00	@	85.00
Binder Boards—			
No. 1, per ton	75.00	@	80.00
No. 2, per ton	70.00	@	75.00
Carload lots	65.00	@	70.00
Tarred Felts—			
Regular	52.25	@	54.25
Slaters (per roll)	.84	@	.94

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White, No. 1.	.07	@	.07½
New White, No. 2.	.05	@	.05½
Light Silesias	.04½	@	.05½
Silesias, No. 1	.04	@	.04½
Black Silesias, soft.	.03	@	—
New Unbleached	.06½	@	—
Washable, No. 1	.02	@	.02½
Blue Overall	.05	@	.05½
Cottons—According to grades—			
Washable, No. 2	.02½	@	.04½
New Blue	.02	@	.02½
Fancy	.02	@	.02½
New Black Soft	.04¼	@	.04¾
New Light Seconds	.04	@	.04¼
New Dark Seconds	1.50	@	—
Khaki Cuttings—			
No. 1 O. D.	.04	@	.04½
No. 2 Mixed	.03½	@	.04½
Corduroy	.02	@	.02¼
New Canvas	.04	@	.04½
New Black Mixed.	.02¼	@	.02½

Domestic Rags (Old)

White No. 1—			
Repacked	4.00	@	4.50
Miscellaneous	3.00	@	3.50
Thirds and Blues—			
Miscellaneous	1.75	@	2.00
Repacked	2.50	@	2.75
Black Stockings (Export)	4.50	@	5.00
Roofing Stock—			
Foreign No. 1	1.75	@	1.80

Bagging

(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	2.00	@	—
Domestic	2.25	@	—
Manila Rope	2.75	@	3.00
Sisal Rope	1.75	@	2.00
Mixed Rope	1.00	@	1.10
Scrap Burlaps—			
No. 1	2.00	@	2.50
No. 2	.90	@	1.00
Wool Tares, heavy	3.00	@	3.25
Mixed Strings	1.00	@	1.10
No. 1 New Light Burlap	3.00	@	3.50
New Burlap Cuttings	2.50	@	2.75

Old Papers

(F. o. b. Phila.)

Shavings—			
No. 1 Hard White.	2.30	@	2.40
No. 2 Hard White.	2.10	@	2.20
No. 1 Soft White.	1.80	@	1.85
No. 2 Soft White.	1.40	@	1.45
No. 1 Mixed.	—	@	.85
Solid Ledger Stock.	1.50	@	1.60
Ledger Stock, white.	1.15	@	1.20
Ledger Stock, colored	.85	@	.90
No. 1 Books, heavy	.65	@	.70
Manila Cuttings	1.50	@	1.60
Print Manila	.50	@	.60
Container Manila	.50	@	.60
Kraft Paper	1.10	@	1.20
No. 1 Mixed Paper	.35	@	.40
Straw Board Chip.	.40	@	—
Binders Board Chip.	.40	@	—
Corrugated Board	.60	@	.65
Overissue News	.60	@	—
Old Newspapers	.40	@	—

BOSTON

Paper

Rag Content Bond & Ledgers—Delivered Zone 1

	Bonds	Ledgers
100% Rag Ext. No. 1	.36	.37
100% Rag	.28	.29
75% Rag	.21	.22
65% Rag	.18	.19
50% Rag	.15	.16
25% Rag	.12½	.13½

Sulphite Bond & Ledgers—Delivered Zone 1

	Bonds	Ledgers
No. 1 Sulphite	7.75	8.75
No. 2 Sulphite	6.75	7.75
No. 3 Sulphite	6.00	7.00
No. 4 Sulphite	5.50	6.50

F.o.b. Mill

Book, Super	.06	@	.09
Book, M. F.	.05½	@	.08½
Book, Coated	.08½	@	.18
Coated Litho	.09	@	.12
Jute Manila No. 1	.11	@	.13
Manila, Sul. No. 1	.04¾	@	.06½
Manila, Sul. No. 2	.03¾	@	.04½
No. 1 Kraft	.04¾	@	.05
No. 2 Kraft	.04½	@	.04¾

(F. o. b. Boston)

Southern Kraft	.03¾	@	.04½

(F. o. b. destination in England lots, f. o. b. mill in less than carload lots) (Delivered New England points)

News Print Rolls	39.50	@	—
Straw Board, rolls	.09	@	35.00
Filled News Board	40.00	@	45.00
Chip Board	37.50	@	40.00
Single Manila Lined Chip	47.50	@	52.50
Single White, Patent Coated News Board (Bender)	55.00	@	65.00
Wood Pulp Board	70.00	@	75.00
Binder Boards (Standard Grade)	67.00	@	75.00

Old Papers

(F. o. b. Boston)

Shavings—			
No. 1 Hard White.	2.00	@	2.20
No. 1 Soft White.	1.75	@	1.90
No. 2 Mixed.	.75	@	.80
Solid Ledger Books	1.40	@	1.50
Overissue Ledger Stock	1.15	@	1.30
Mixed Ledgers	.85	@	.90
No. 1 Books, heavy	.60	@	.70
No. 1 Books, light	.50	@	.60
Crumpled Stitchless Book Stock	.50	@	.60
Manila Env. Cuttings	1.60	@	1.70
No. 1 Old Manila	.60	@	.65
White Blank News	1.30	@	1.35
No. 1 Kraft	1.15	@	1.20
Mixed Papers	.22½	@	.25
Print Manila	.50	@	.60
Container Manilas	.27½	@	—
Old Newspaper	.27½	@	.30
Overissue News	—	@	.40
Box Board Chips	—	@	.25
Corrugated Boxes	.40	@	.45
Kraft corrugated boxes	.95	@	1.00
Screening Wrappers	.40	@	.45

Bagging

(F. o. b. Boston)

Manila Rope—			
Foreign	2.40	@	2.50
Domestic	2.40	@	2.50
Transmission Rope	1.45	@	1.25
Jute Rope	2.00	@	2.25
Jute Carpet Threads	1.00	@	1.10
Gunny No. 1—			
Foreign	2.15	@	2.25
Domestic	1.90	@	2.10
Bleachery Burlap	4.00	@	4.50
Scrap Burlap—			
Foreign	2.20	@	2.35
Domestic	1.90	@	2.10
Scrap Sisal	2.00	@	2.25
Scrap Sisal for Shredding	2.25	@	2.50
Wool Tares, heavy	2.25	@	2.35
New Burlap Cuttings	2.25	@	2.35
Australian Wool Pouches	3.15	@	3.30
Heavy Baling Bagging	2.50	@	2.75
Paper Mill Bagging	1.75	@	2.00
Bagging No. 2	1.25	@	1.50

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints.	.01¾	@	.02
New White No. 1.	.06¾	@	.07
New White No. 2.	.04	@	.04¼
Silesias No. 1	.04¾	@	.05
New Black Silesias	.02½	@	.03
Soft Unbleached	.06¾	@	.07
Blue Cheviot	5.25	@	5.50
Fancy	.02½	@	.02¾
Washable	.0165	@	.0170
Cottons—According to grades—			
Blue Overalls	5.50	@	6.00
New Black, soft	.04	@	.04¾
Khaki Cuttings	.04	@	.04¾
O. D. Khaki	.04	@	.04¾
Corduroy	.01¾	@	.02
New Canvas	—	@	.05
B.V.D. Cuttings	—	@	.06¼

Domestic Rags (Old)

(F. o. b. Boston)

Canvas	.04½	@	—
White No. 1—			
Repacked	—	@	2.75
Miscellaneous	2.50	@	2.75
White No. 2—			
Repacked	1.90	@	2.00
Miscellaneous	2.00	@	2.25
Twos and Blues	1.50	@	2.00
Thirds and Blues—			
Repacked	1.37½	@	1.75
Miscellaneous	1.25	@	1.62½
Black Stockings	2.50	@	3.00
Roofing Stock—			
No. 1	1.70	@	1.80
No. 2	1.50	@	1.60
No. 3	1.20	@	1.25

Foreign Rags

(F. o. b. Boston)

Dark Cottons	1.85	@	1.90
New White Shirt Cuttings	6.50	@	6.75
Dutch Blues	2.25	@	2.50
New Checks & Blues	2.50	@	3.00
Old Fustians	1.90	@	2.00
Old Linsey Garments	2.25	@	2.50
New Silesias	4.75	@	5.25

TORONTO

Paper

(F. o. b. Mill)

Bond—			
No. 1 Sulphite	.11	@	—
No. 2 Sulphite	.08½	@	—
No. 1 Colored	.12	@	—
No. 2 Colored	.09	@	—
Ledgers (sulphite)—			
Ledgers, No. 1	.34½	@	—
Ledgers, No. 2	.25½	@	—
Writing	.09	@	.09½
Book—			
No. 1 M. F. (Carloads)	6.50	@	—
No. 2 M. F. (Carloads)	6.00	@	—
No. 3 M. F. (Carloads)	6.00	@	—
No. 1 S. C. (Carloads)	7.00	@	—
No. 2 S. C. (Carloads)	6.50	@	—
No. 3 S. C. (Carloads)	6.50	@	—
No. 1 Coated and Litho	12.00	@	—
No. 2 Coated and Litho	10.50	@	—
No. 3 Coated and Litho	9.50	@	—
Coated tinted	13.00	@	—
Wrapping—delivered—			
Rag Brown	4.75	@	—
White Wrap	3.50	@	—
"B" Manila	5.25	@	—
No. 1 Manila	5.40	@	—
Fiber	5.40	@	—
Kraft, M. F.	5.90	@	—
Kraft, No. 2	5.40	@	—

(F. o. b. Cars Toronto)

News, per ton—			
Rolls (contract)	39.50	@	—
Sheets	44.50	@	—

Pulp

Ground wood	27.00	@	—
Unbleached Sulphite	42.00	@	—
Book (Class 1)	58.00	@	—
Writing (Class 2)	59.00	@	—
Select (Class 3)	60.00	@	—

Old Waste Paper

(In carload lots, f. o. b. Toronto)

Shavings—			
White Env. Cut	2.00	@	2.25
Soft White	1.60	@	1.90
White Blk. News	1.25	@	1.40
Book and Ledger—			
Flat Magazine and Book Stock (old)	.90	@	1.00
Light and Crumpled Book Stock.	.80	@	.90
Ledgers and Writings	1.00	@	1.05
Manilas—			
New Manila Cut	1.25	@	1.40
Printed Manilas	.50	@	.60
Kraft	1.00	@	1.60
News and Scrap—			
Strictly Overissue	.55	@	—
Strictly Folded	.50	@	—
No. 1 Mixed Paper	.40	@	—

Domestic Rags

(Price to mills, f. o. b. Toronto)

No. 1 White Shirt Cuttings	.06¼	@	.06½
Fancy Shirt Cuttings	.02¼	@	.02½